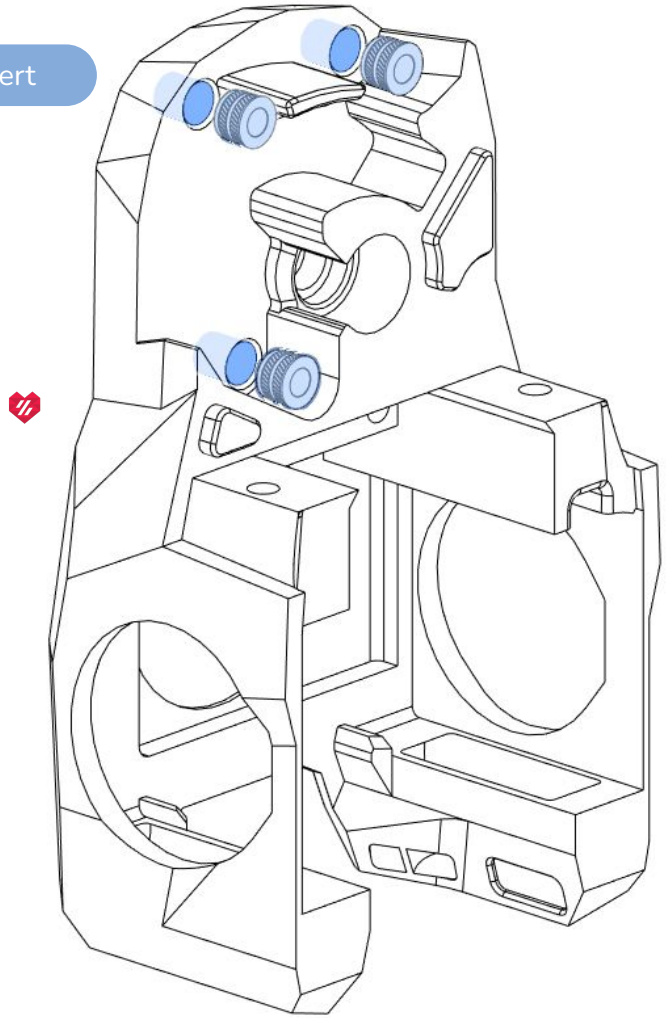
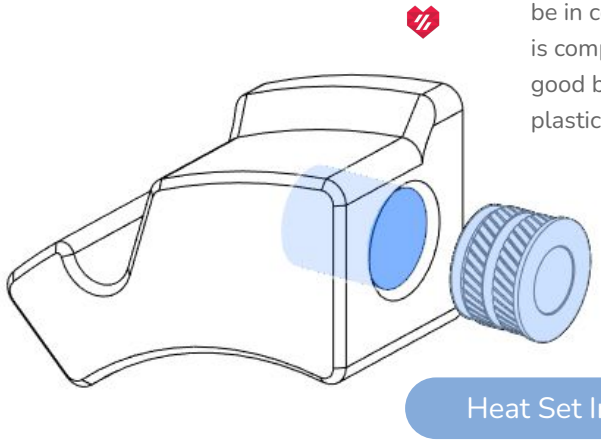


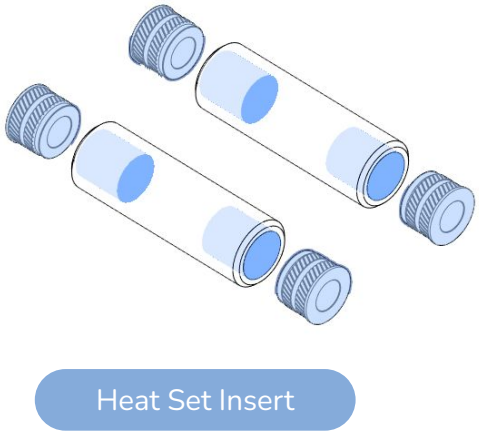
KNOW YOUR TARGET AND BEYOND

Before heating your iron, check that you will not contact, or unintentionally melt, surrounding plastic while installing heat inserts in the toolhead components.

GETTING A GOOD BOND

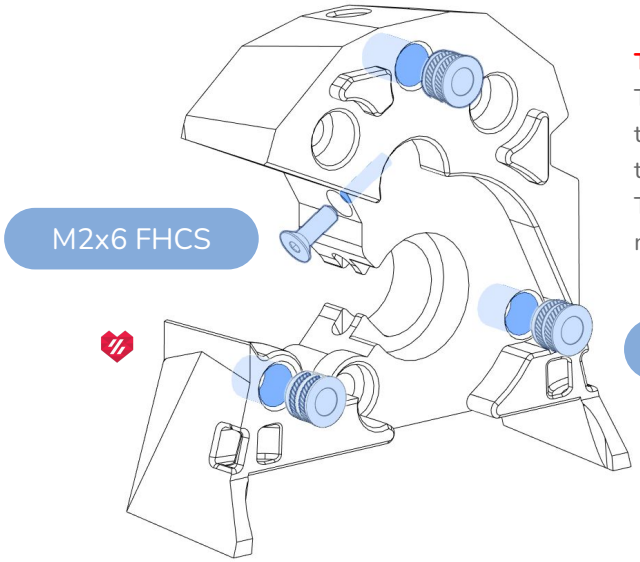
The heat set insert in the shuttle will be in constant tension when assembly is complete. It's important to get a good bond between the insert and the plastic for this part.





STUPID !@#$% STANDOFFS!

The printed standoffs are fiddly and weak...we know this. Luckily, if you want, you can buy solid metal M3x20mm standoffs that replace these printed parts.

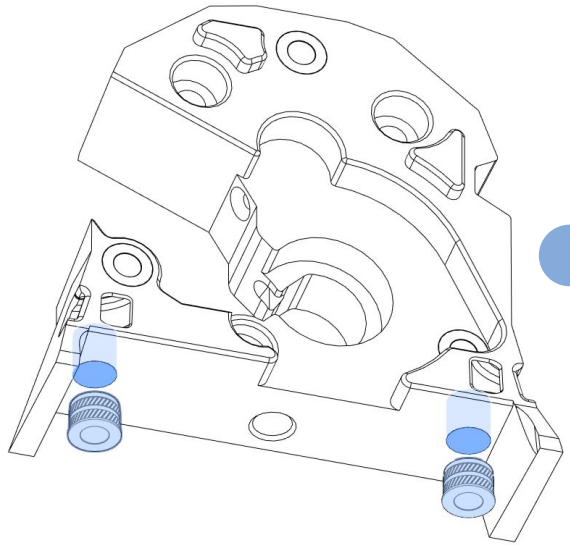


M2x6 FHCS

THREADING INTO PLASTIC

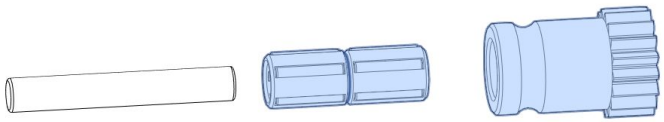
This M2 screw threads into the plastic of the Mid-Body part. It will be used to adjust the meshing of the BMG gears at a later step. Threading it all the way in at this step will make it easier to access later on.

Heat Set Insert



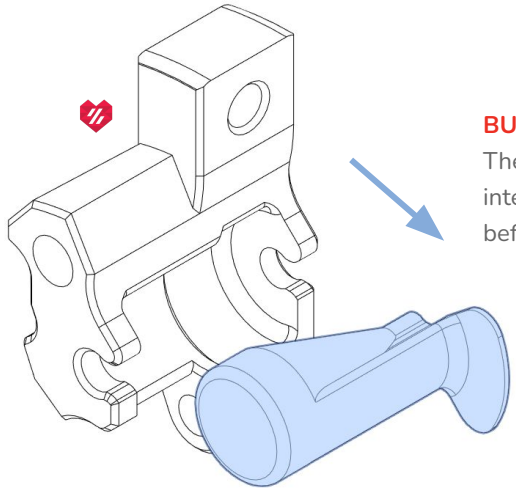
Heat Set Insert

BMG Idler Assembly



LUBRICATE BEARINGS

A lubrication film is required to ensure smooth operation and longevity. Refer to the Voron sourcing guide for lubricant options.

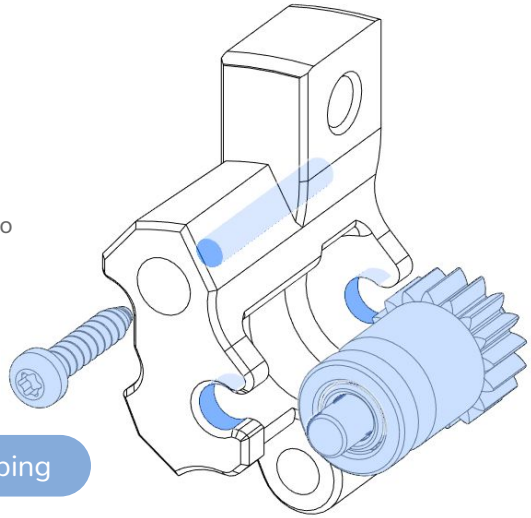


BUILT-IN SUPPORT

The guidler part prints with an integrated support. Remove this before moving to the next step.

ADDED STRENGTH

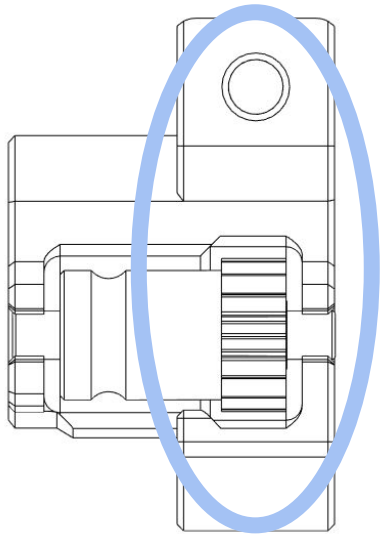
This screw is there to provide extra strength to the guidler component along its layer lines.

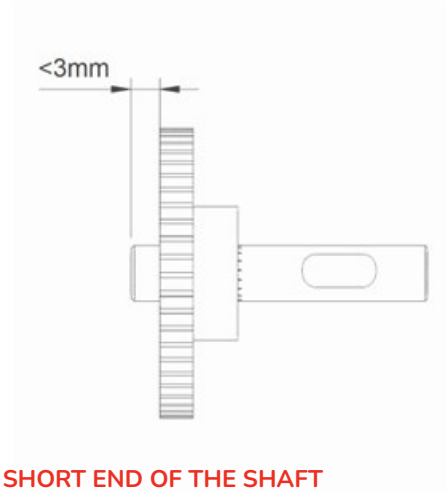


M2x10 Self Tapping

CHECK ORIENTATION

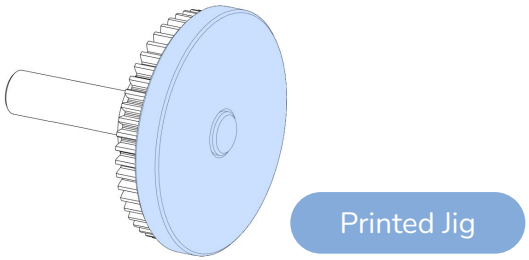
The larger gear section must be on the right hand side. Check for any rubbing or binding.



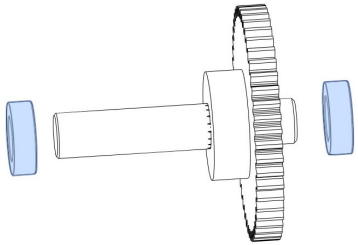


SHORT END OF THE SHAFT

Check the short end of the shaft. If it is longer than 3mm shorten it to under 3mm. The design for a printed jig that can be used to help sand down the shaft is included in the released files.



Printed Jig



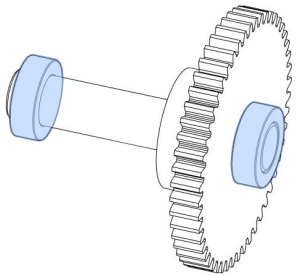
CHECK BEARING FIT

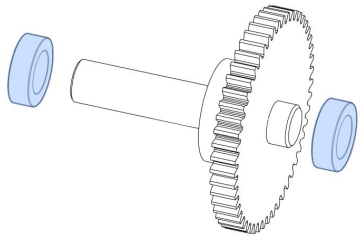
The bearings must slip on and off the shaft easily to allow the gear to self center. Do **not** shim into position.

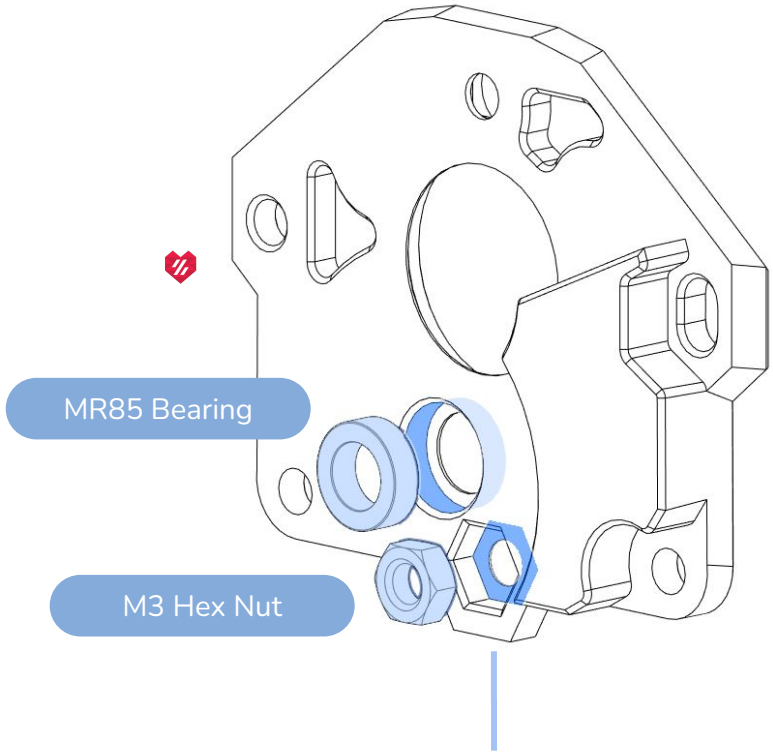
Pressing the bearings on the shaft will damage them.

Lightly sand the shaft if required.

Remove the bearings from the shaft after checking the fit and continue with the assembly.





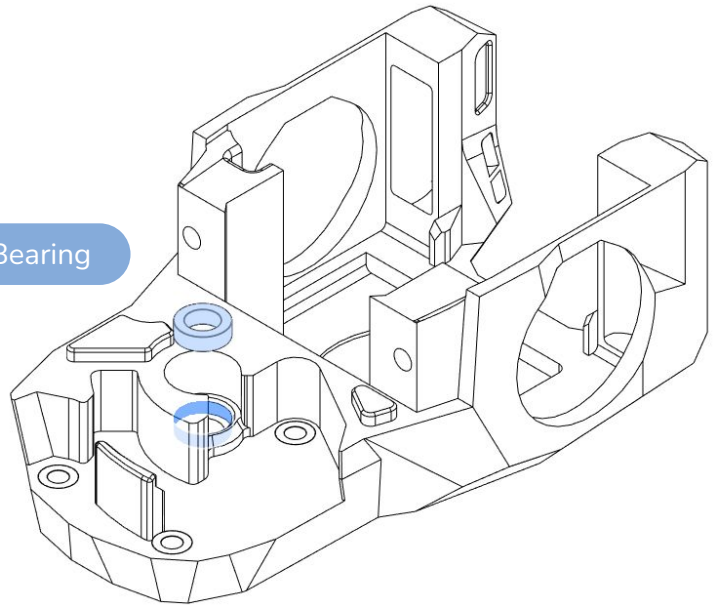


SUPER GLUE THIS HEX NUT

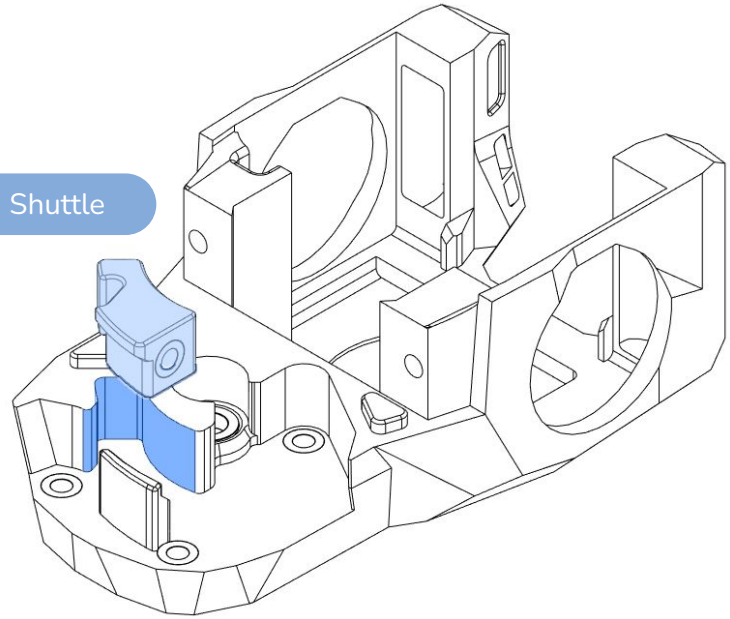
It is critical that this hex nut not come out of this printed part, adding a small dab of CA glue will help it stay in place, be sure not to get glue on the threads.

DO NOT apply glue to the bearing.

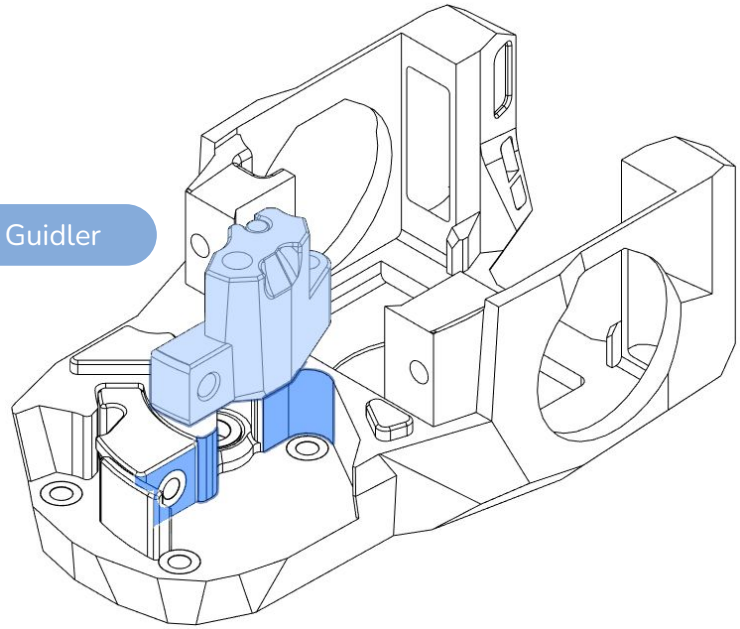
MR85 Bearing



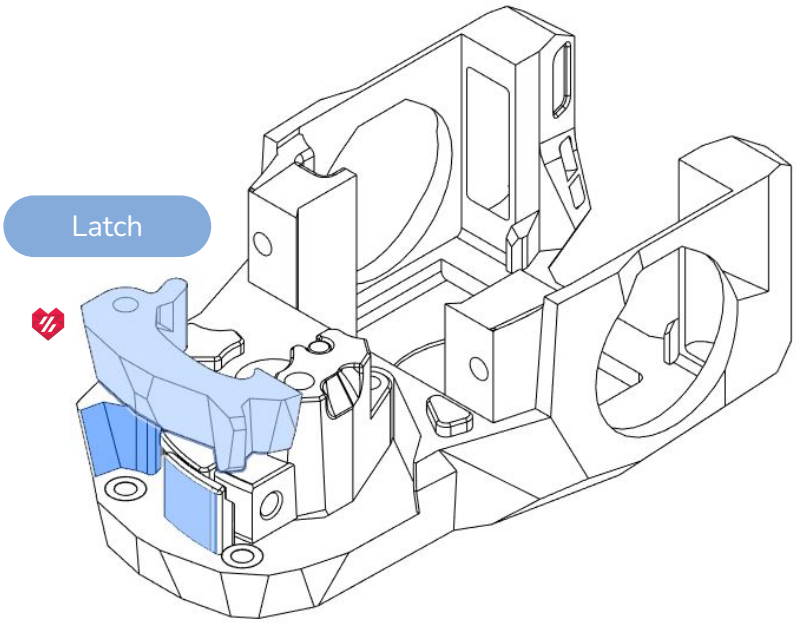
Shuttle



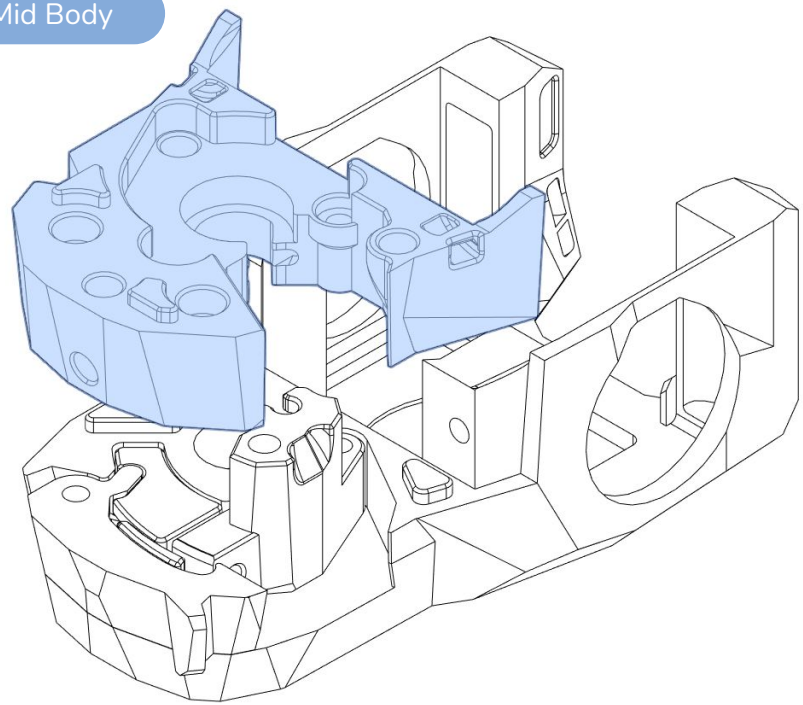
Guidler



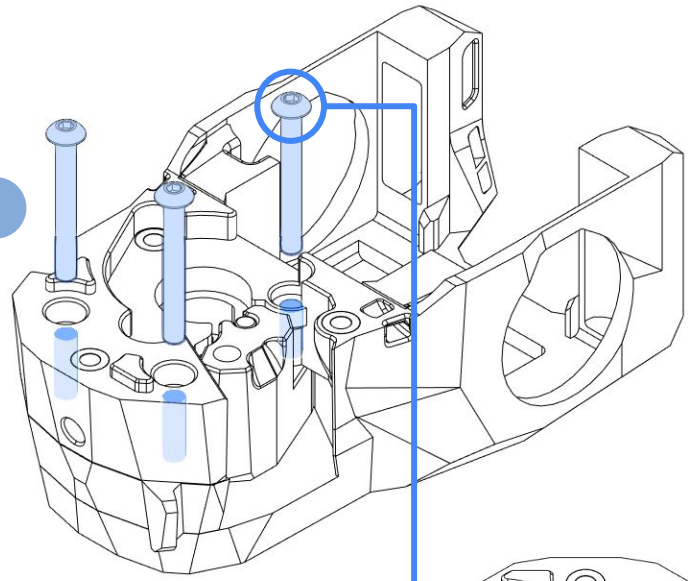
Latch



Mid Body



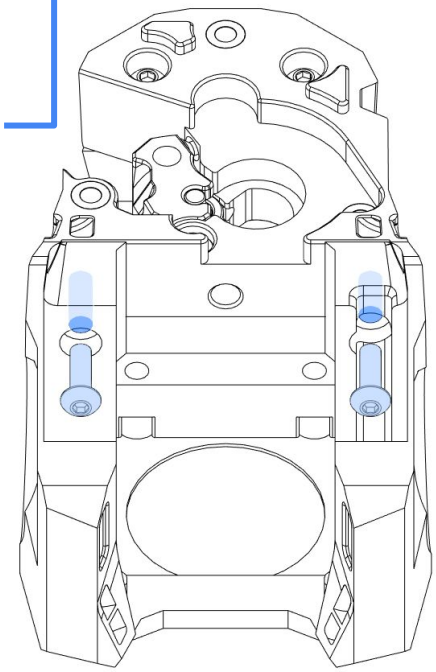
M3x25 BHCS

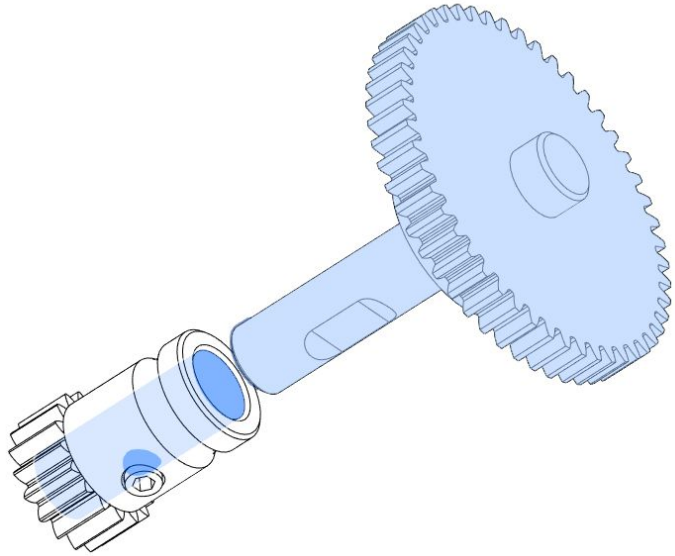


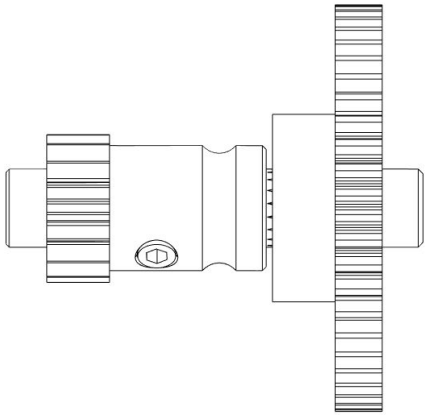
HINGE PIN

The lower M3x25 screw acts as a hinge pin for the guidler arm, be sure not to over tighten it, check that the guidler can still move smoothly.

M3x10 BHCS

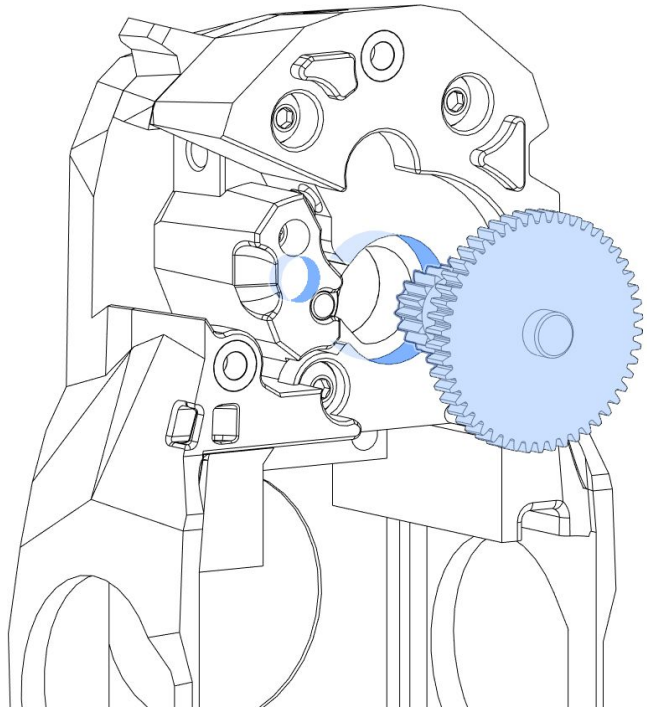


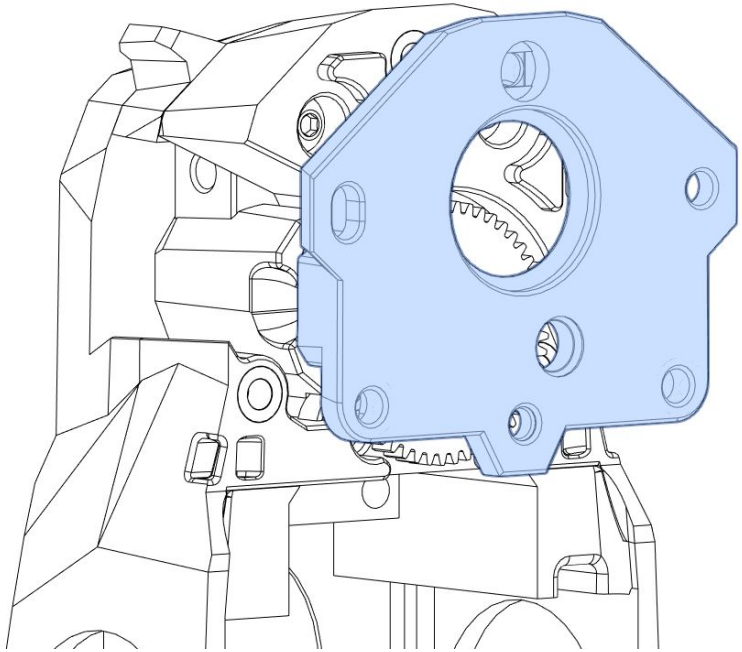


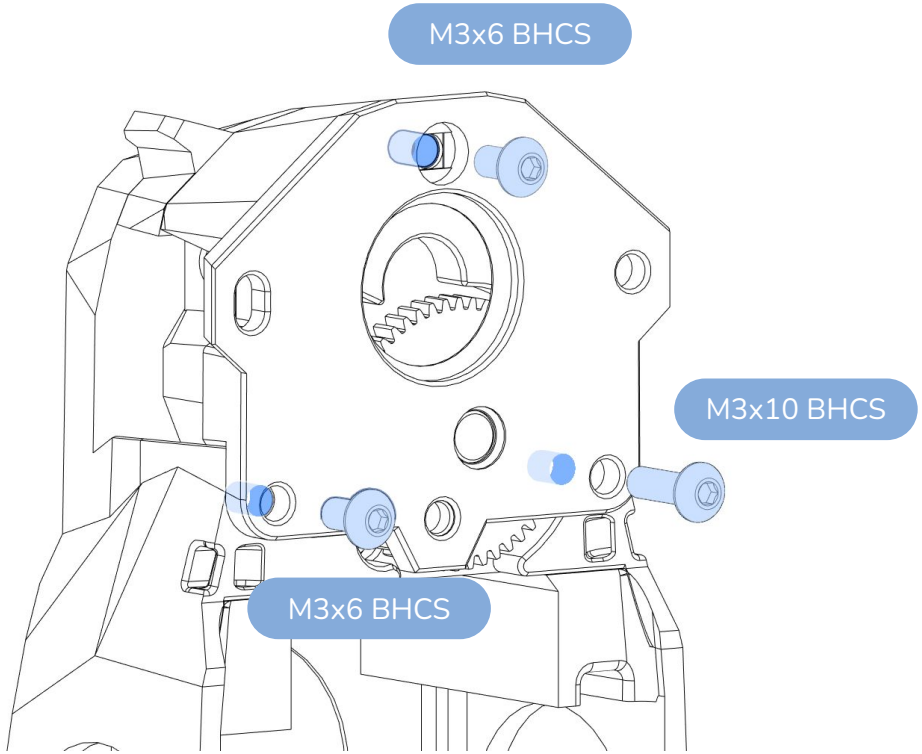


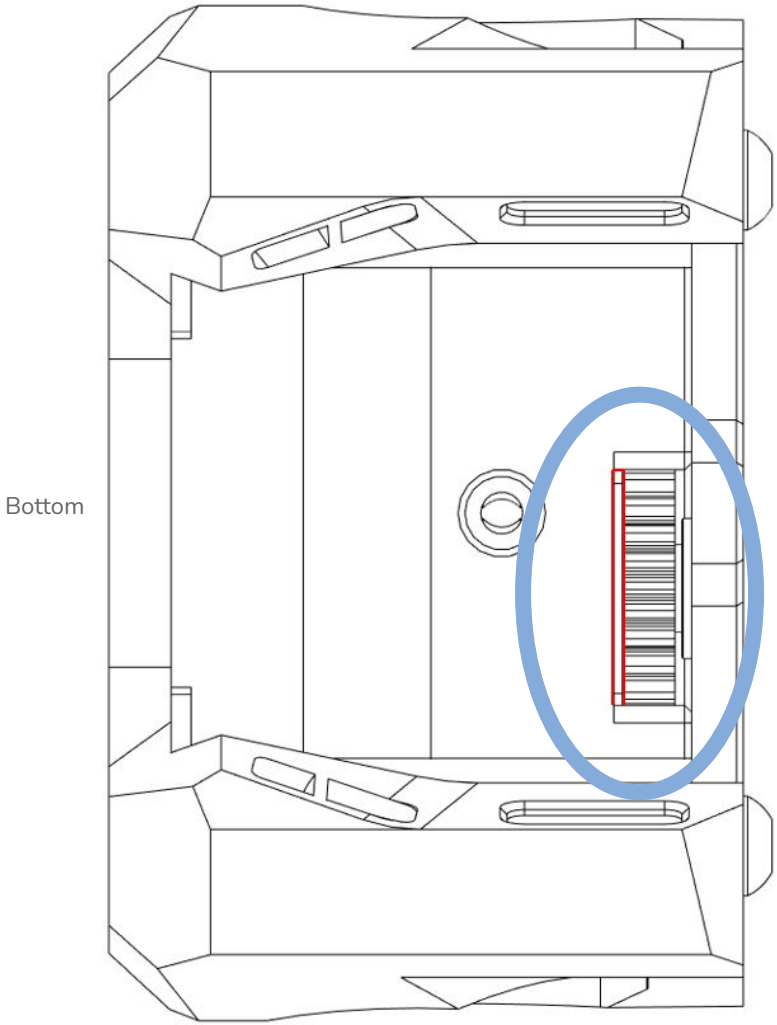
CHECK ORIENTATION

The drive gear is mounted opposite of how it is usually mounted in an extruder. Make sure that the grub screw has sufficient contact with the flat. Do not tighten the grub screw yet, we will finalize the gears exact position on the shaft in the next few steps.



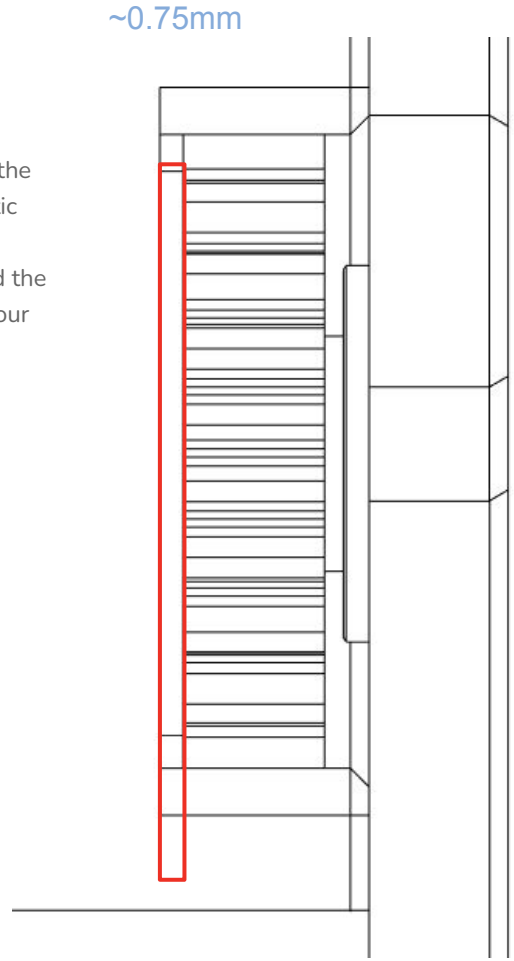



M3x6 BHCS
M3x10 BHCS
M3x6 BHCS



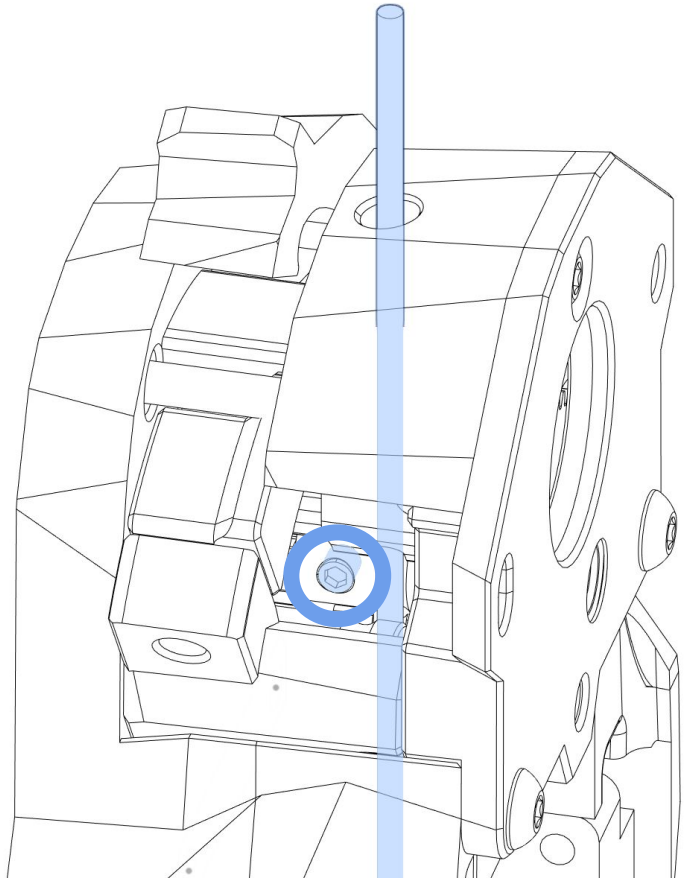
50T GEAR SPACING

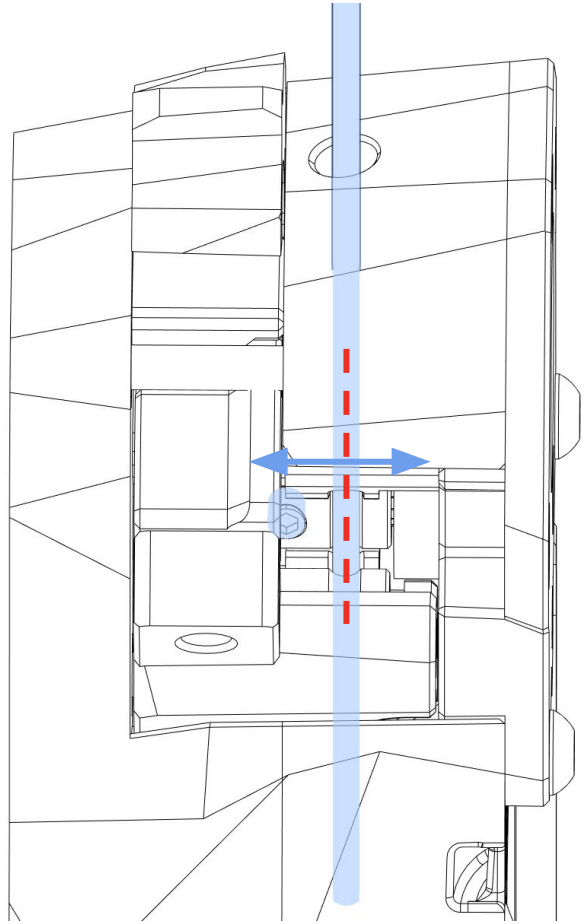
For the next steps we need to ensure that the 50T gear is not rubbing on any of the plastic parts. It should be generally centered in its available space between the mid-body and the motor plate, as shown below. Make sure your guidler door is open so that you can freely adjust the position of the 50T.



ALIGN THE DRIVE GEAR

While the 50T gear is centered open the guidler and loosen the grub screw on the BMG drive gear with a small allen key, then adjust its position left to right so that the filament path is aligned with the gear teeth. Hold the 50T in position while adjusting the drive gear so that it is still centered in its gap. Once happy, tighten the grub screw. Be sure to not rotate the 50T gear while doing this so that the flat section of the shaft is still under the grub screw location.



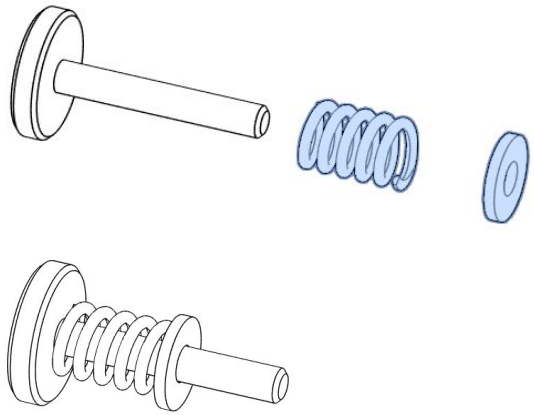


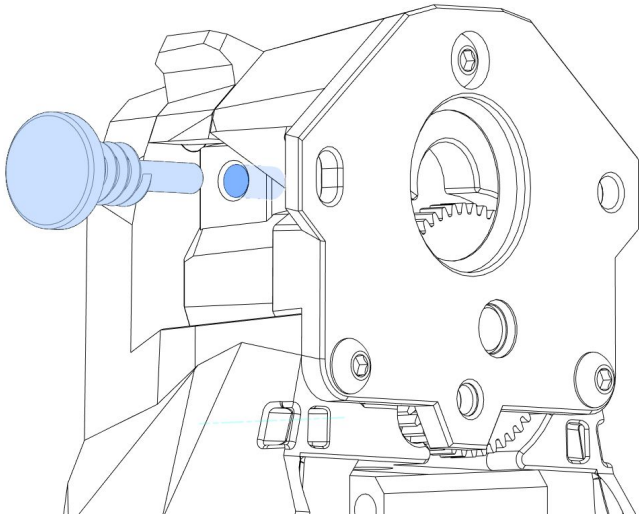
USE A PIECE OF FILAMENT

A piece of filament can be a handy guide to ensure the grooves in your drive gear align correctly with the filament path of the printed parts.

A NOTE ON SPRINGS

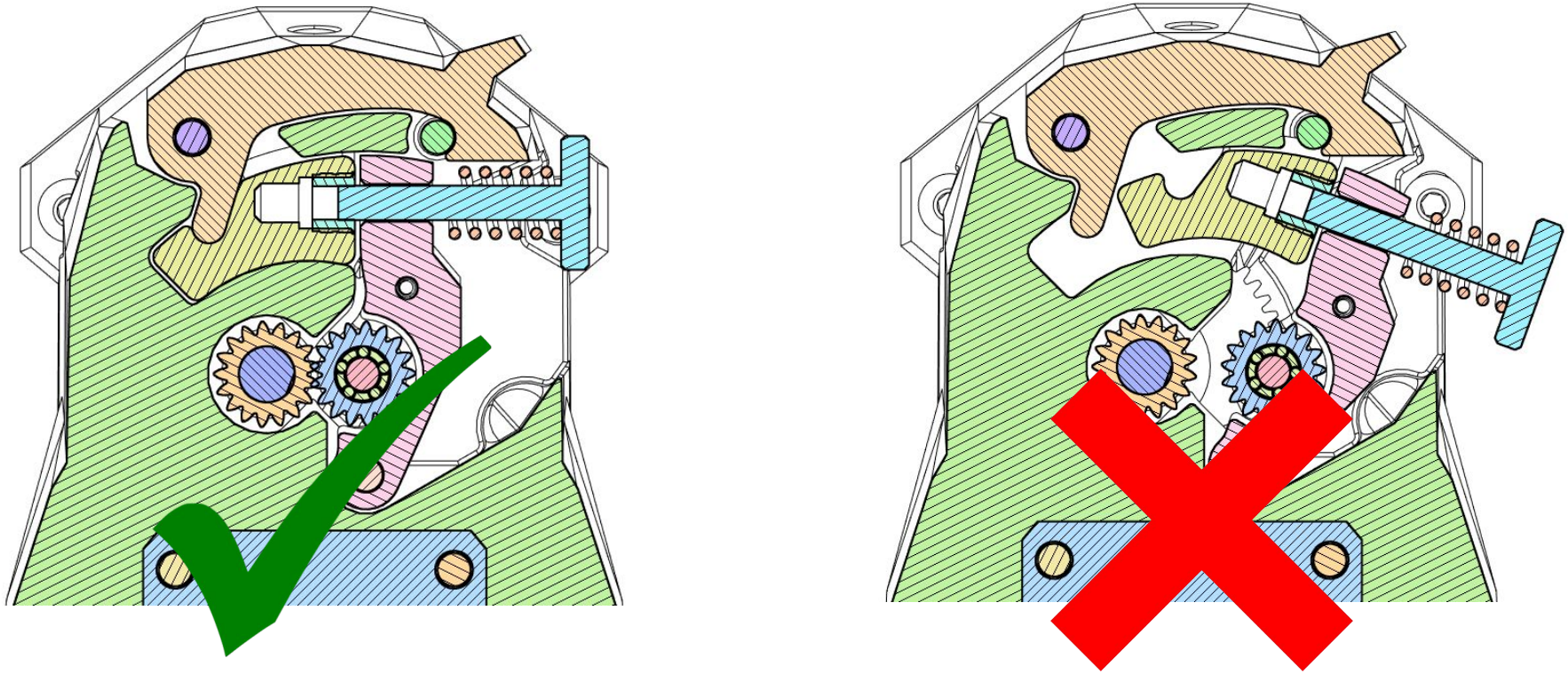
Longer/shorter/stiffer springs will change the tension characteristics and have an impact on how well the tension mechanism works. Consider buying the original Bondtech part as those are known to work well. If you sourced from a different vendor, check that it is roughly 12mm long with an outer diameter of 6mm and a wire thickness of 1mm.





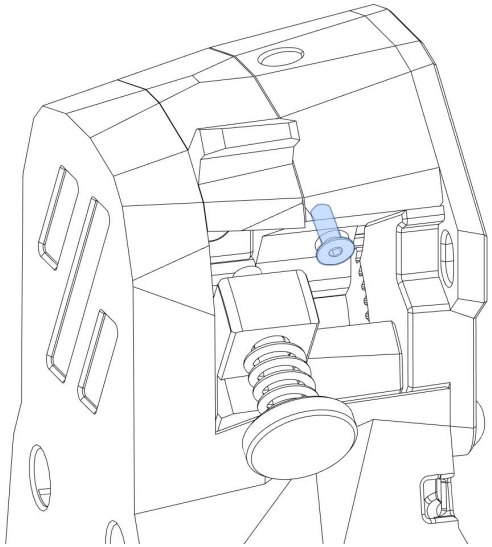
TENSION KNOB

Turning the thumb screw clockwise will increase the tension and grip on the filament. Too much tension will result in print issues.



LATCH SHUTTLE

The latch mechanism must seat into the groove of the shuttle piece. This is what allows the extruder to grip the filament effectively.

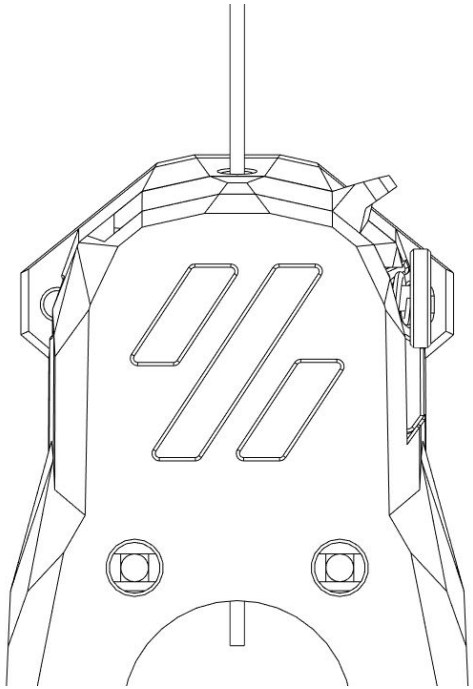


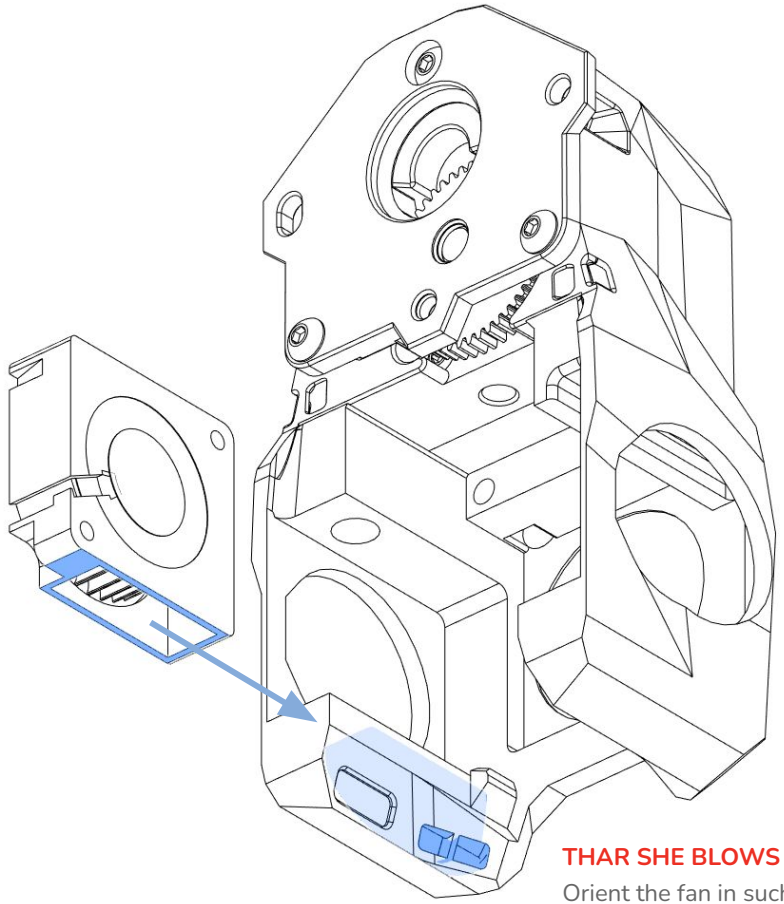
ANTI SQUISH THINGYMAJIG

Softer and flexible materials will deform and extrude poorly under too much tension. Mini Stealthburner adds an anti-squish thingymajig screw that sets the minimum distance between the drive gear and the idler, Backing this screw out increases this distance and tightening the screw in decreases this distance. Setting this minimum distance helps to prevent the gears from meshing too tightly or binding up in the extruder

LIGHT TEETH MARKS

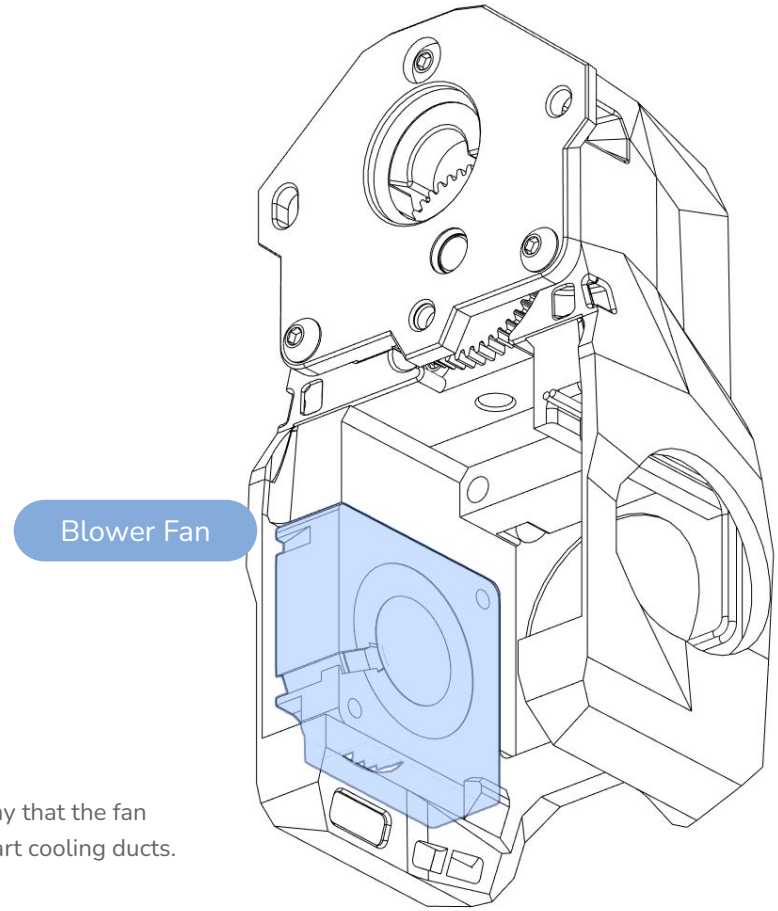
Close the latch and put a piece of filament through the extruder, then spin the 50T with your finger to test the feeding capability. You are looking for light teeth marks on the surface of the filament. We will repeat this step once more after the motor is installed.

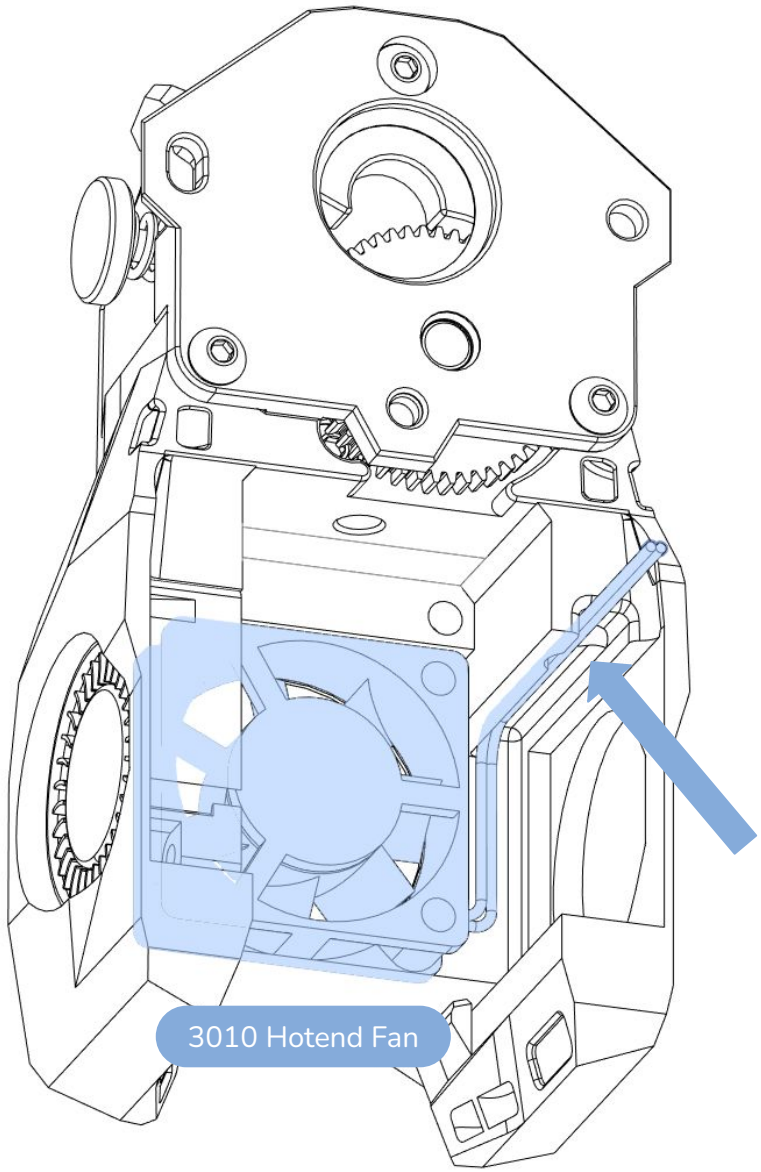




THAR SHE BLOWS

Orient the fan in such a way that the fan will blow down into the part cooling ducts.



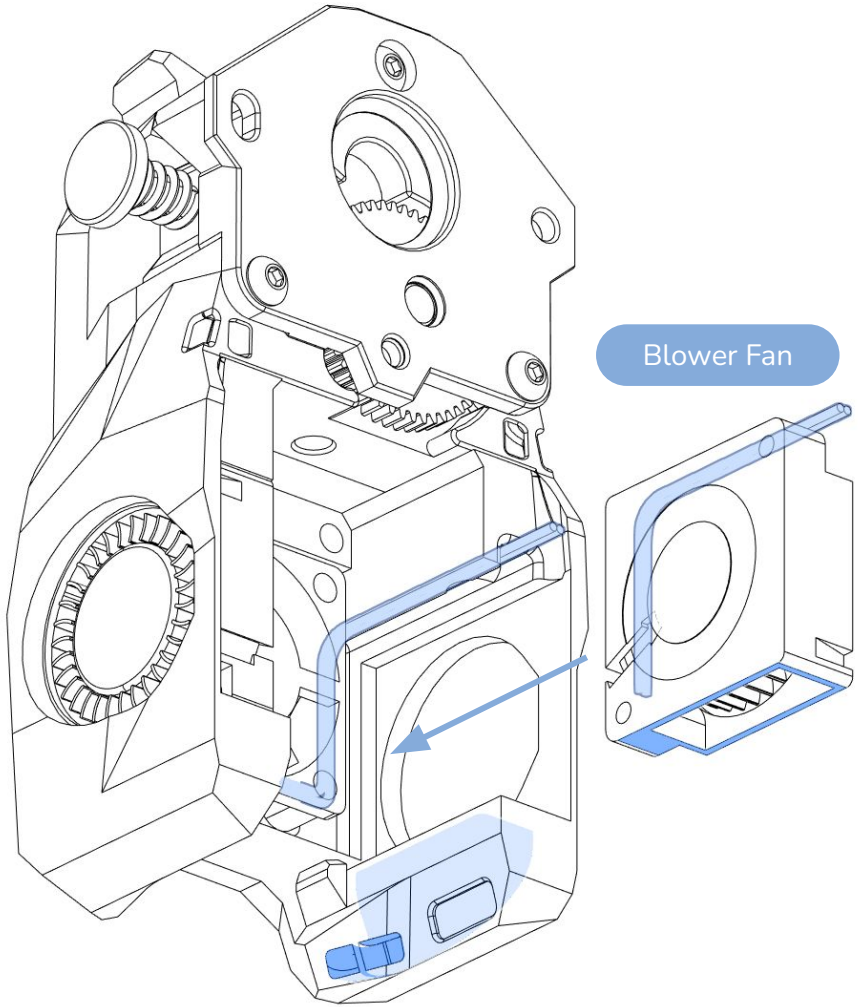


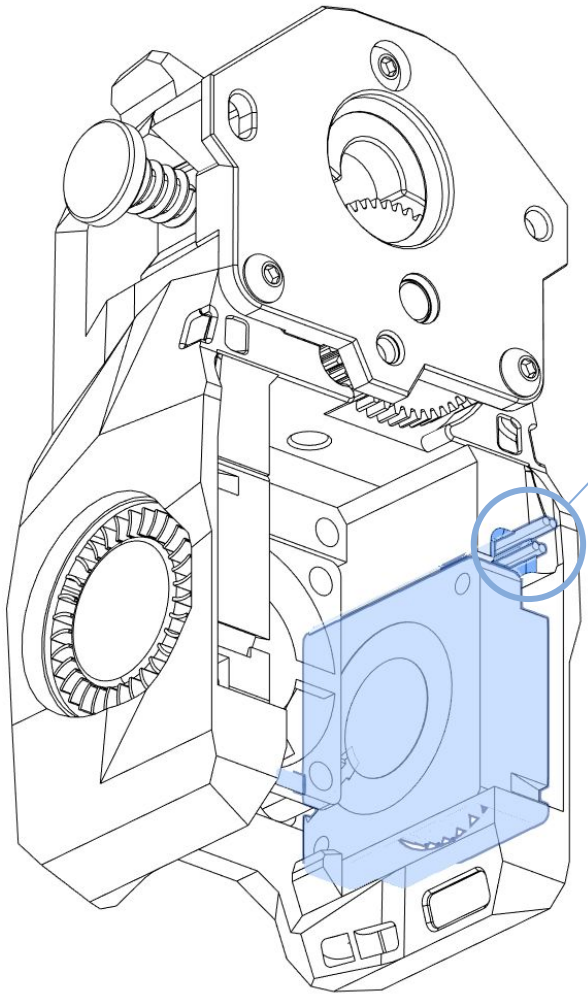
AIRFLOW DIRECTION

Orient the fan in such a way that the air is pushed into the cowling. You'll find small arrows on the fan indicating the air flow direction. The side of the fan that has the sticker typically faces toward the hotend.

WIRING PATH

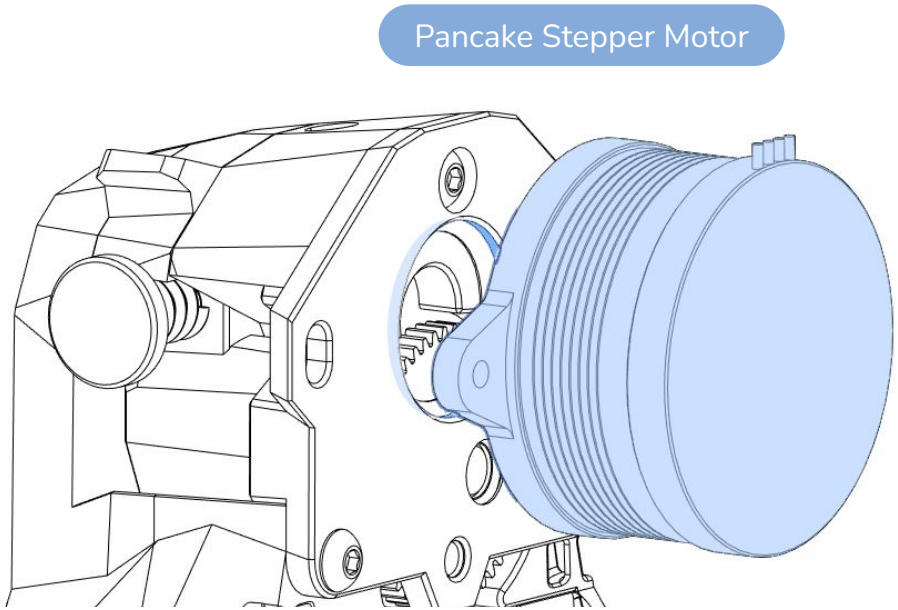
Orient the fan in such a way that you can guide the wires in the highlighted path.

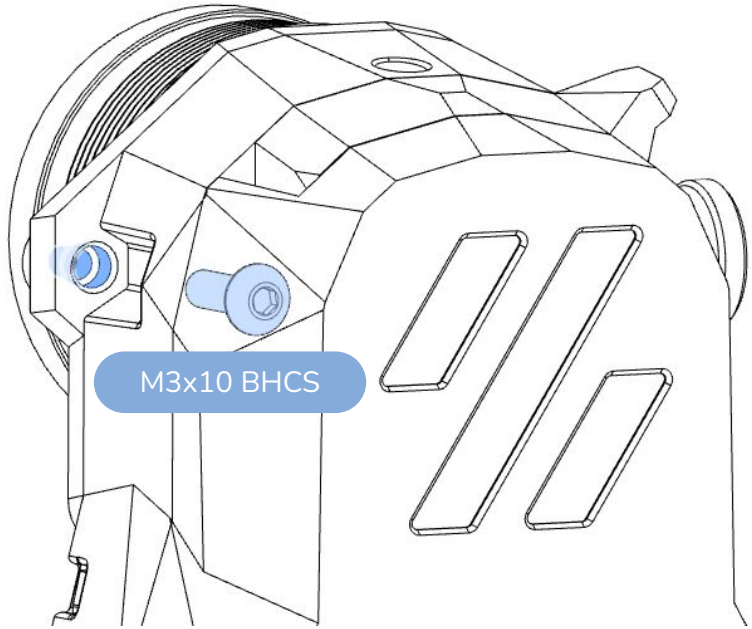




WIRING PATH

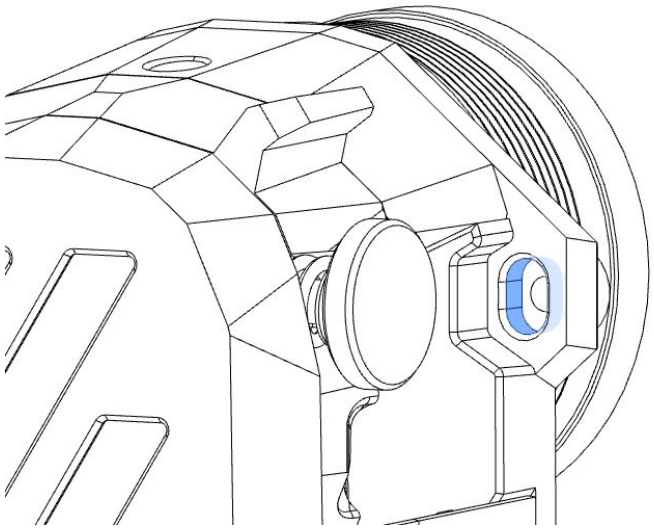
Guide the wires in the highlighted path.





GETTING GEARED UP

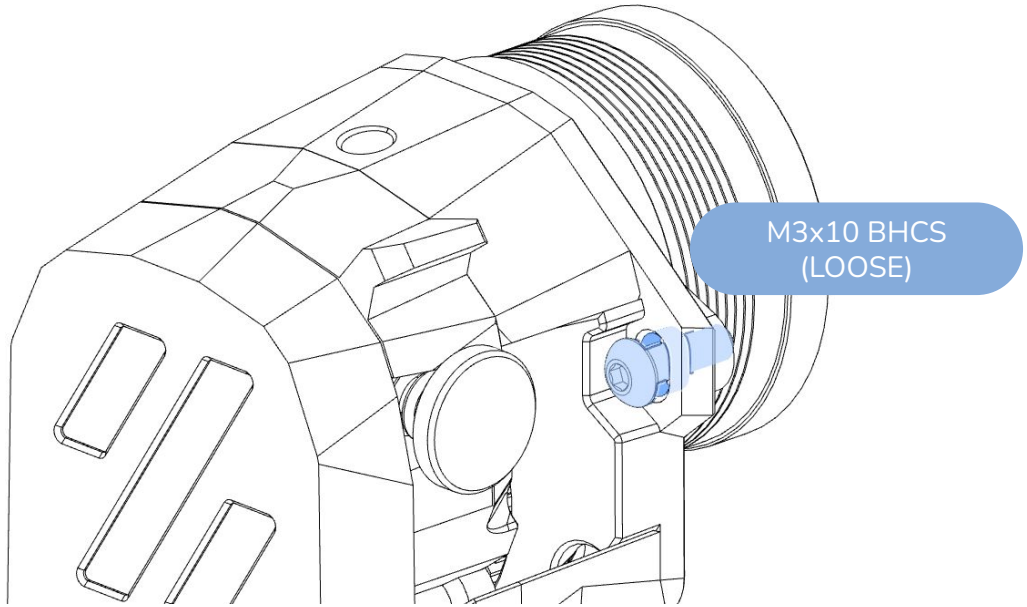
We are only slightly tightening this M3x10 for now. We will be setting the proper gear mesh before fully tightening the motor to the rear of the print head.

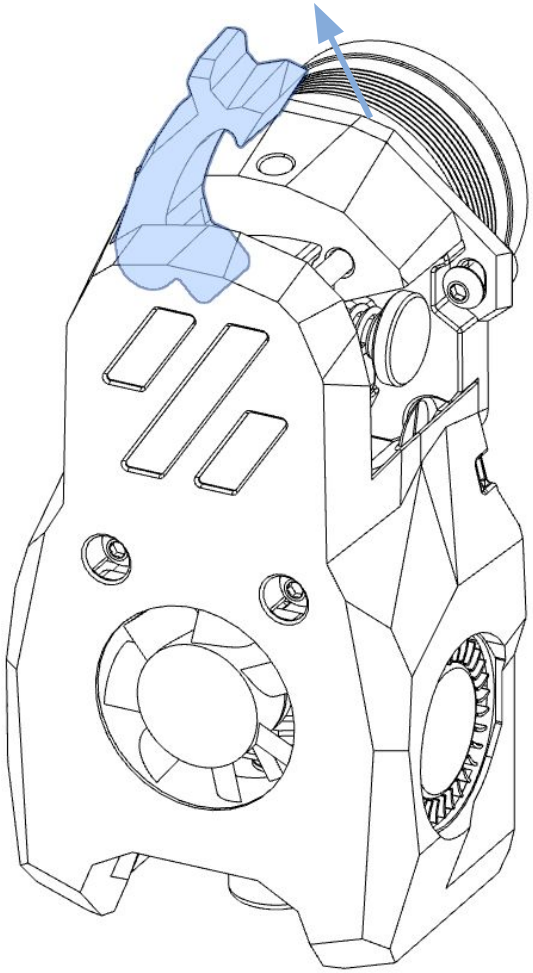


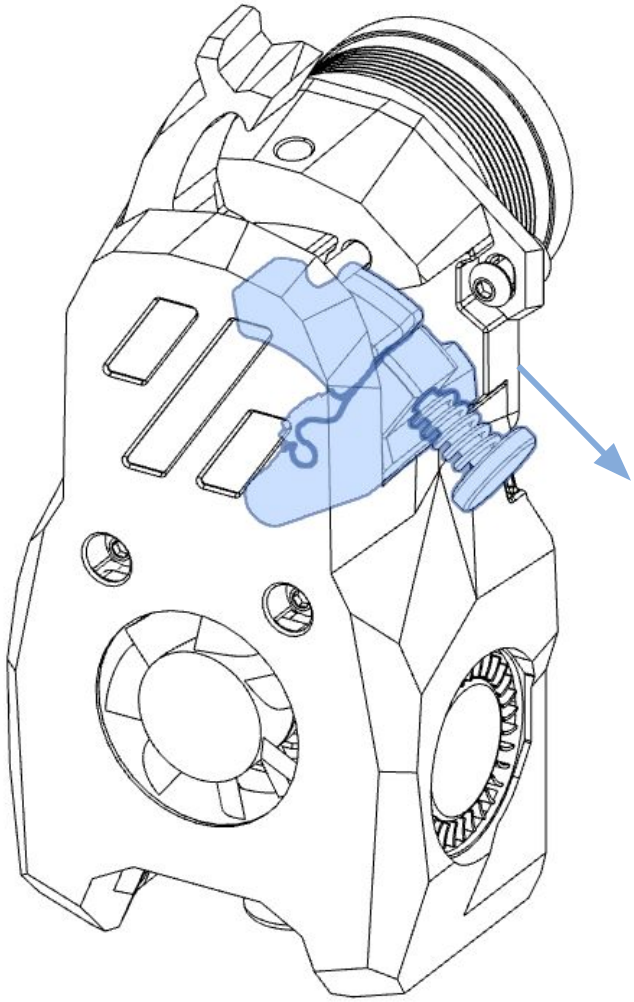
DESIGN WITH INTENT
The screw hole on the right of the motor plate is slotted to allow proper gear mesh adjustment. This is also called “backlash.”

The M3x10 BHCS we are inserting here will need to be **loose** until proper backlash is found.

M3x10mm...ARE YOU SURE?
Yes. these screws need to have extra thread on the back side to attach spacers for the strain relief. If you are using a toolhead PCB you still need the extra thread and spacers.



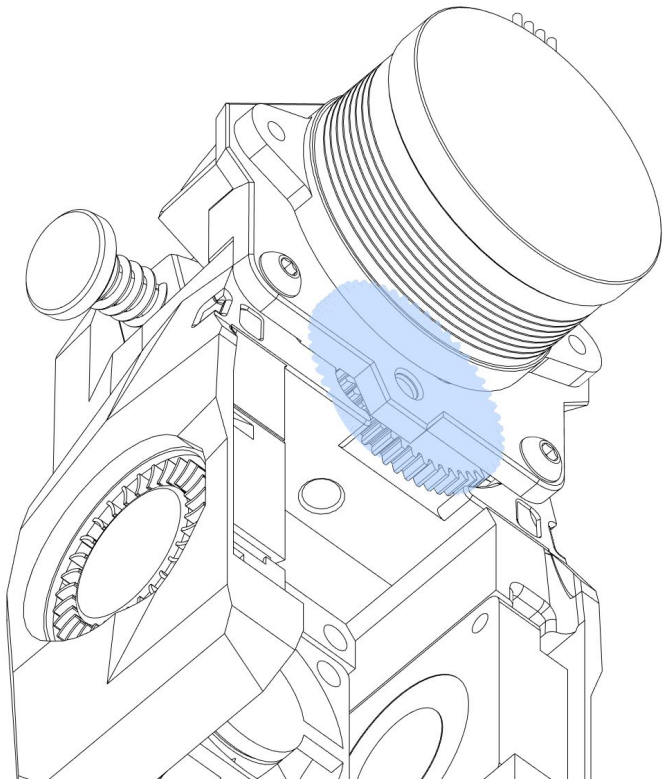




BETTER GET YOUR BI-FOCALS

Open up the extruder latch and drop the guidler down so you can freely rotate the 50T gear.

On the next page we will be setting the proper gear mesh between the motor 10T pinion and the BMG 50T gear. You will benefit from good lighting and some magnification, but it is not a requirement.



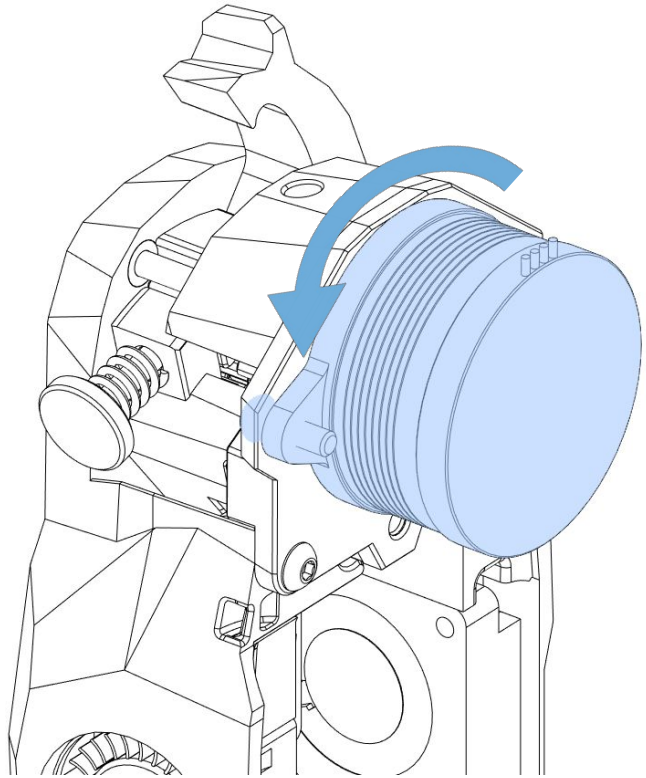
ADJUSTUSTING MOTOR BACKLASH

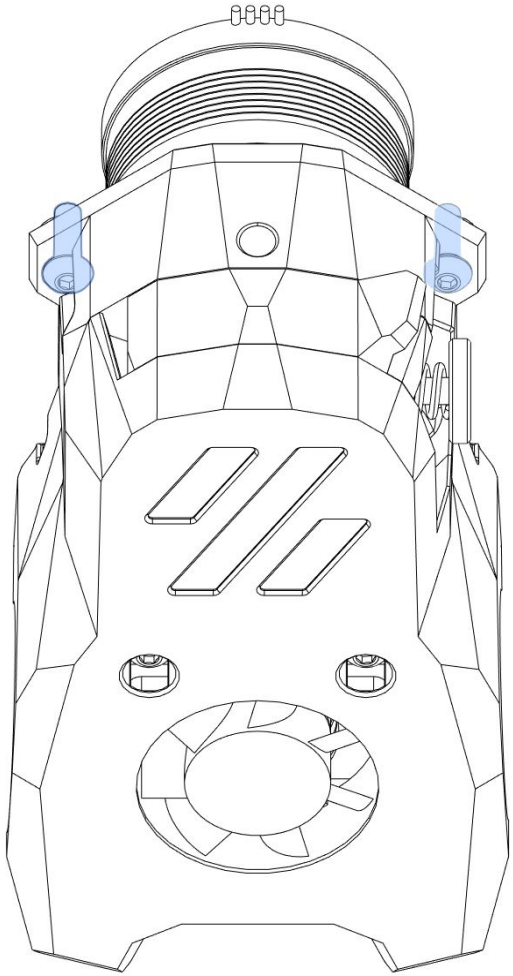
We need to adjust the amount of engagement between the motor pinion and the 50T gear.

With the latch and guidler open, hold the print head at an angle that allows you to easily see and move the 50T gear.

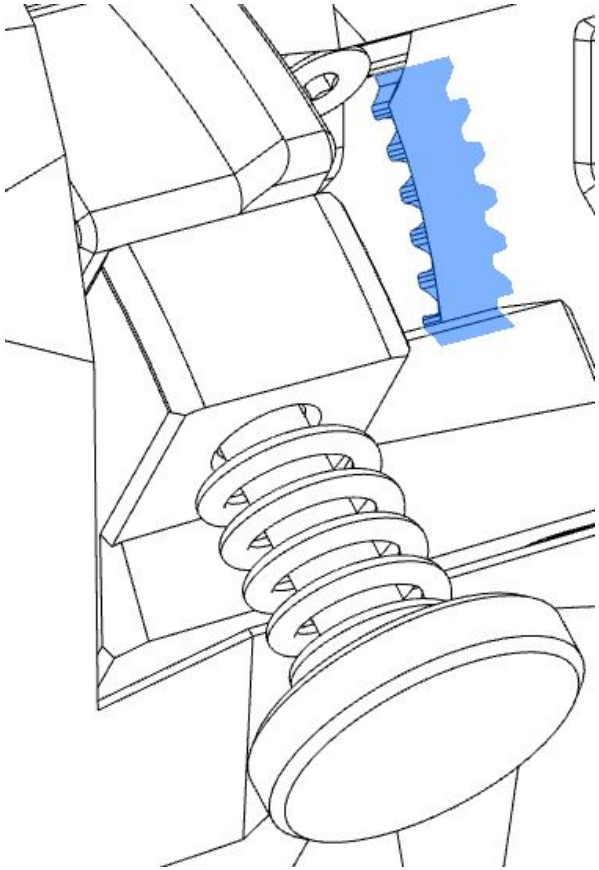
Use you finger to manipulate the 50T gear back and forth. As you do so rotate the motor down into the gear. As the two gears begin to mesh you will feel and see the play in the 50T gear become less and less. Once you have a very small amount of movement, your gear meshing is set.

Once you feel good about the gear meshing you have, snug up the two M3x10 BHCS in the next step, and make sure you still have some backlash after you have those screws tightened. Zero backlash will cause premature wear of the 50T gear.



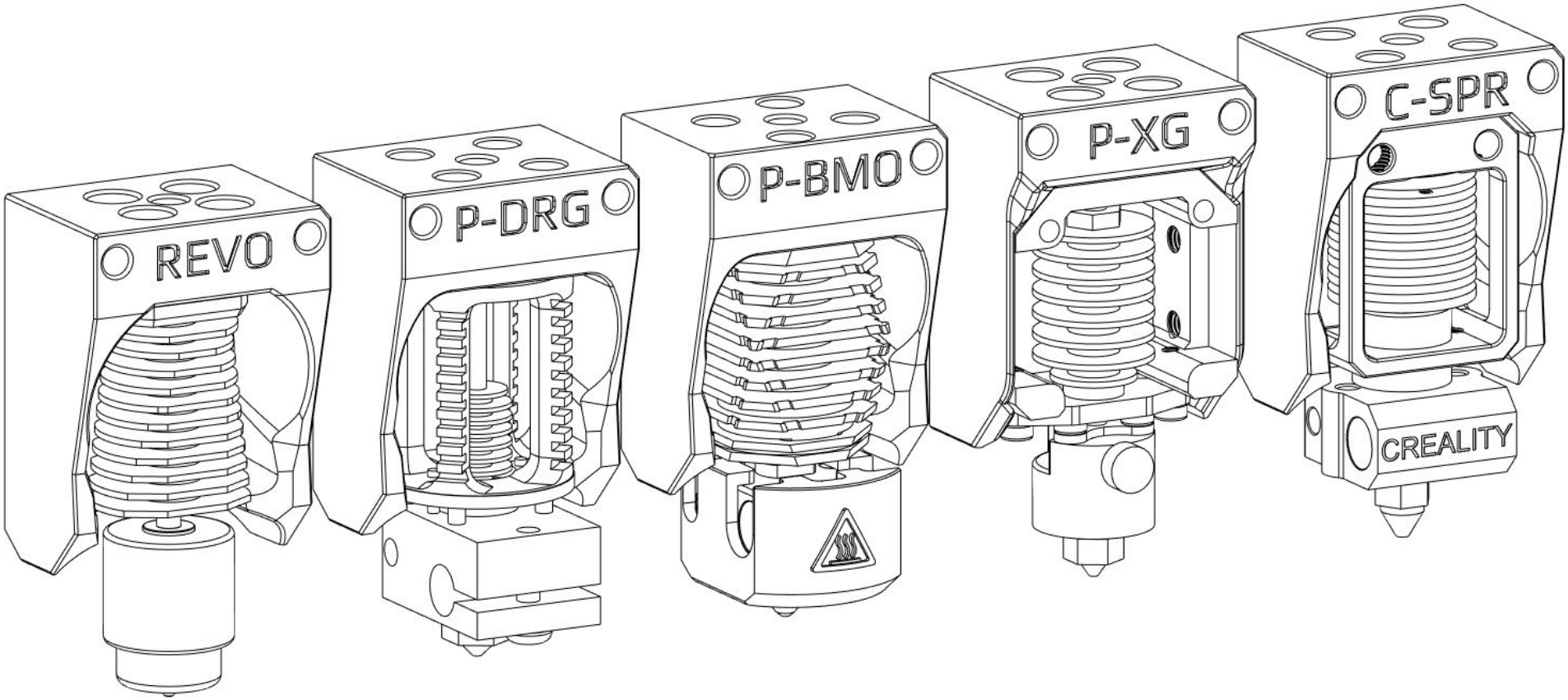


M3x10 BHCS



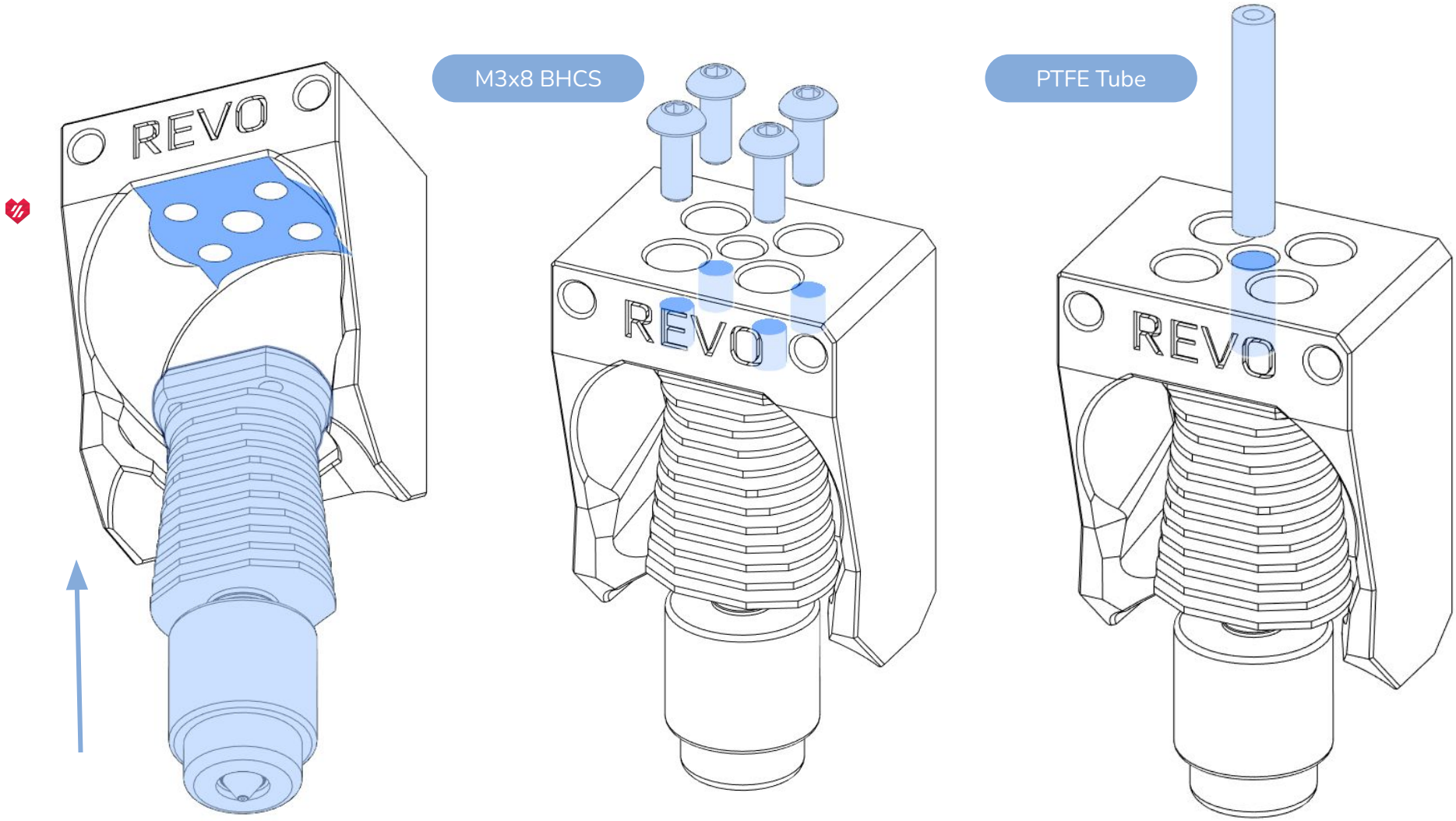
BETTER SAFE THAN SORRY

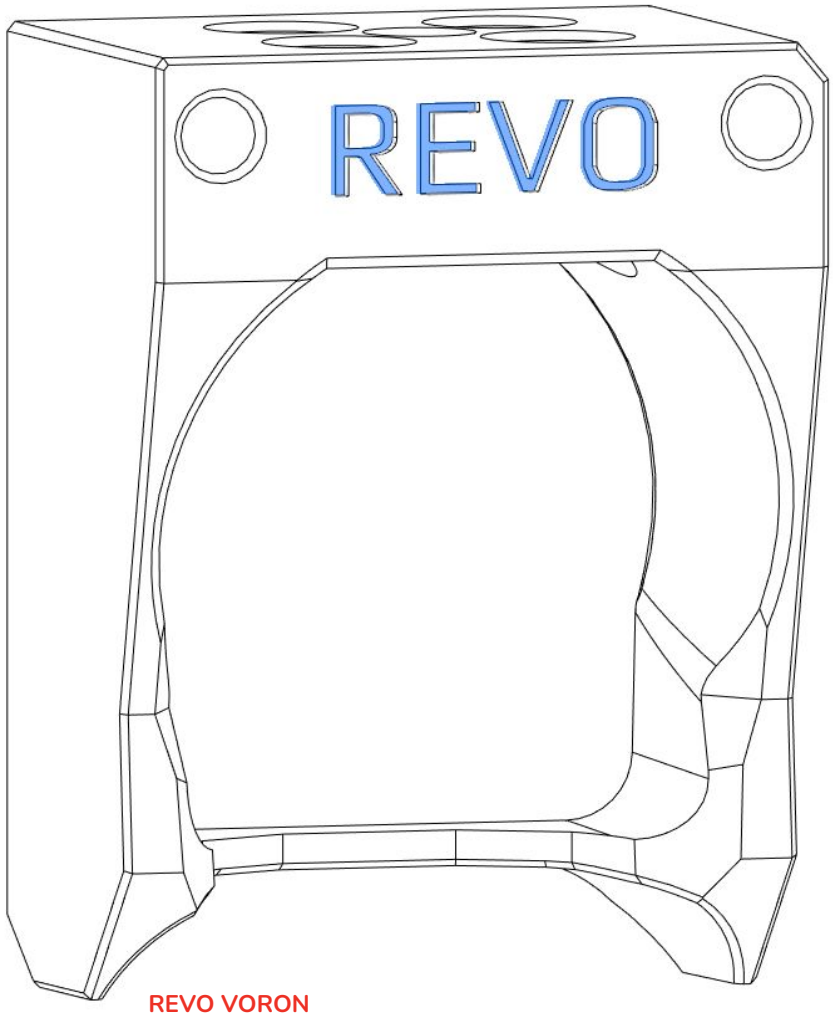
After tightening down these 2 screws, be sure to re-check that you still have proper gear meshing and that you still get light teeth marks on the filament when it is fed through the extruder so there are no surprises when the time comes to push plastic.



HOBSON'S CHOICE...

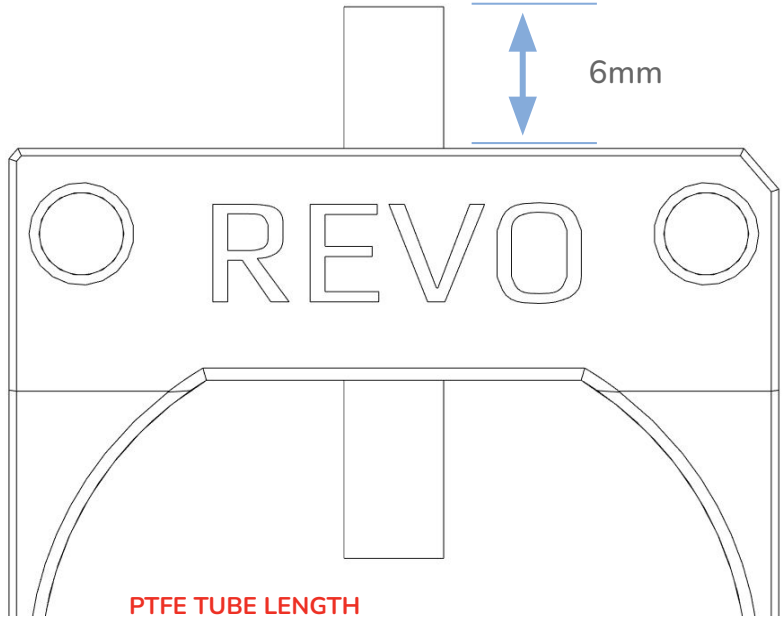
There are a number of hotends that are compatible with the V0 toolhead. There is no “best” hotend, choose the hotend that fits the criteria you find most important. The rest of the toolhead instructions will show only the Revo Voron. The only difference in assembly between the hotends will be the screws needed on the next page.


M3x8 BHCS
PTFE Tube
REVO
REVO
REVO



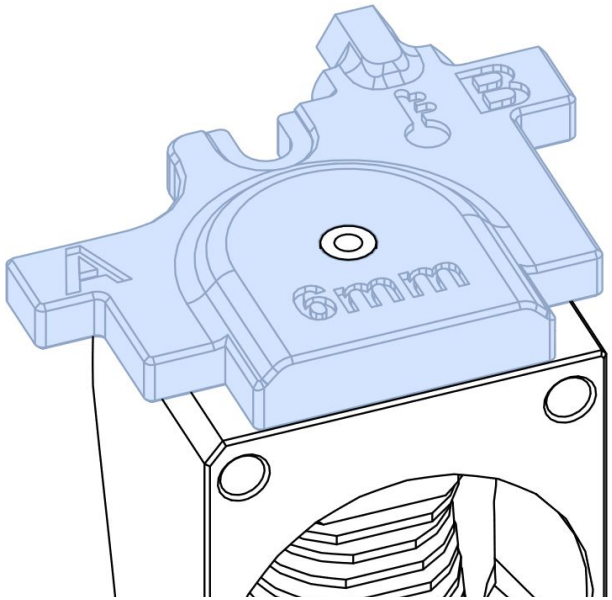
REVO VORON

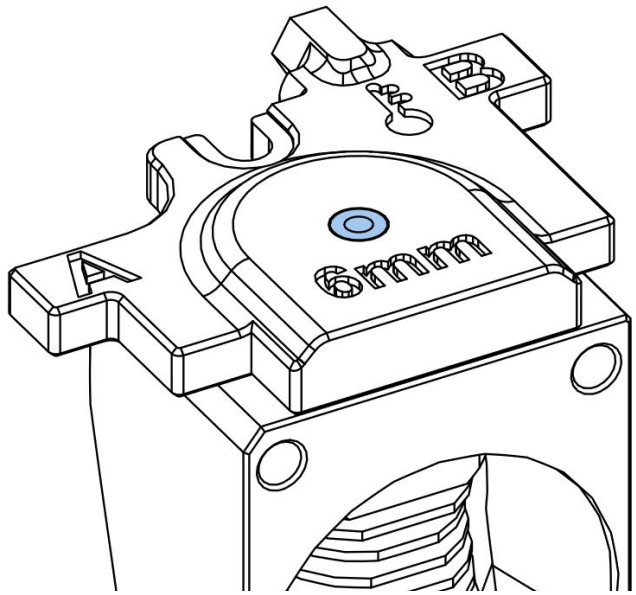
The hardware and assembly shown here is for the REVO Voron hotend. Your hotend may use different screw lengths, each hotend also has a printed mount that is specific to the hotend being used.

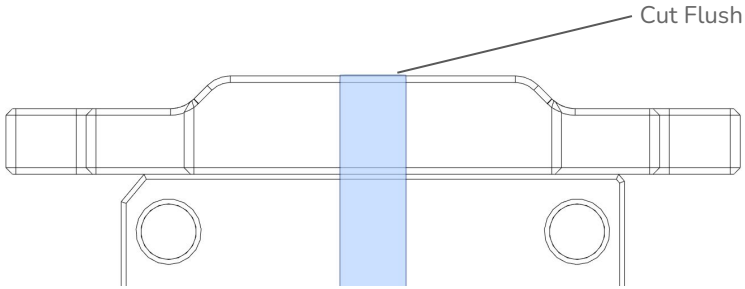


PTFE TUBE LENGTH

The total length of your PTFE tube will be dependant on the hotend you choose. Regardless, the tube must be cut to a length which enables it to protrude from the top of the hotend mount by 6mm. The other end of the tube should be captured by the hotend. When installed in the rest of the toolhead, the tube should not have any extra room to move up or down.

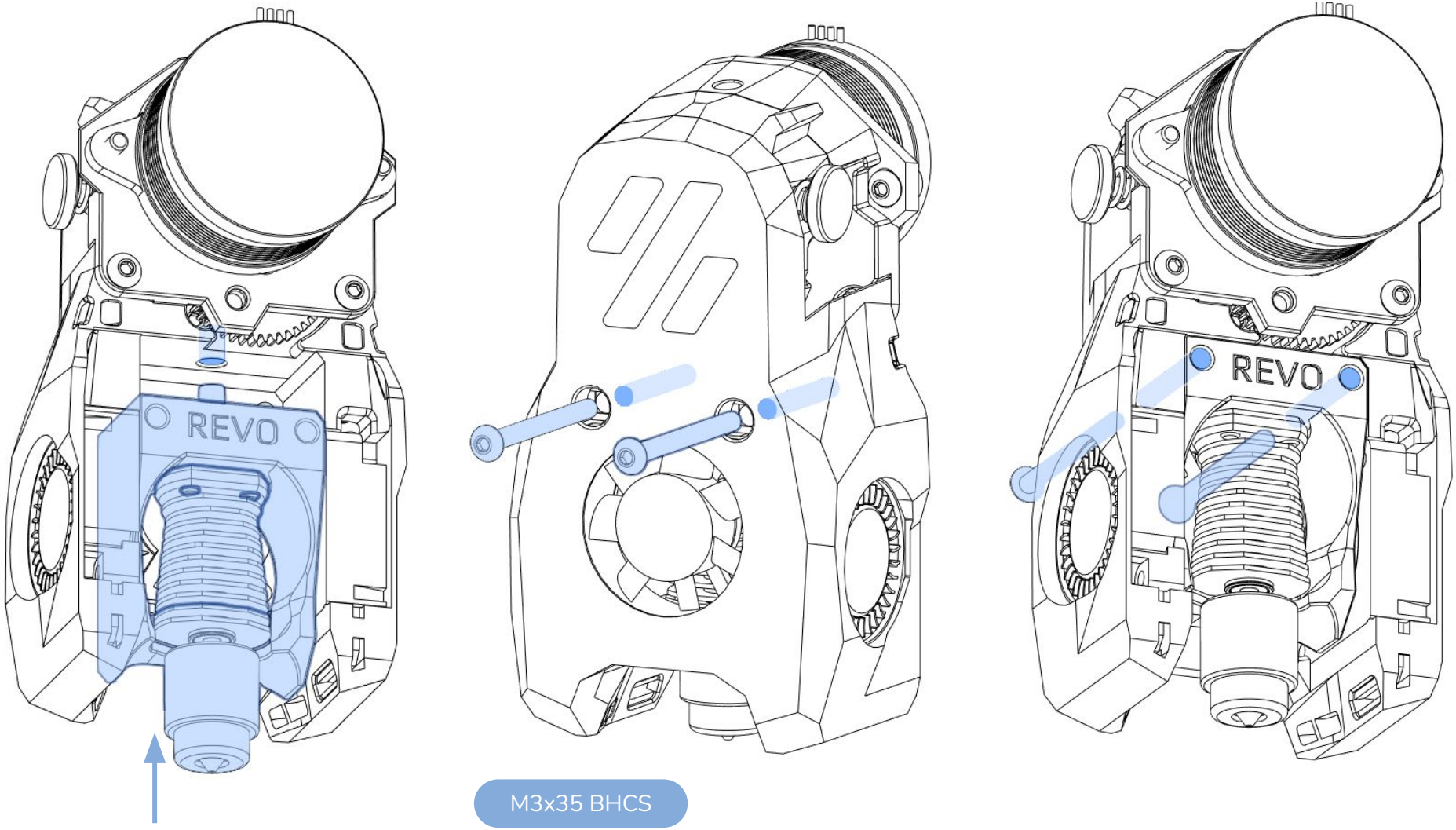


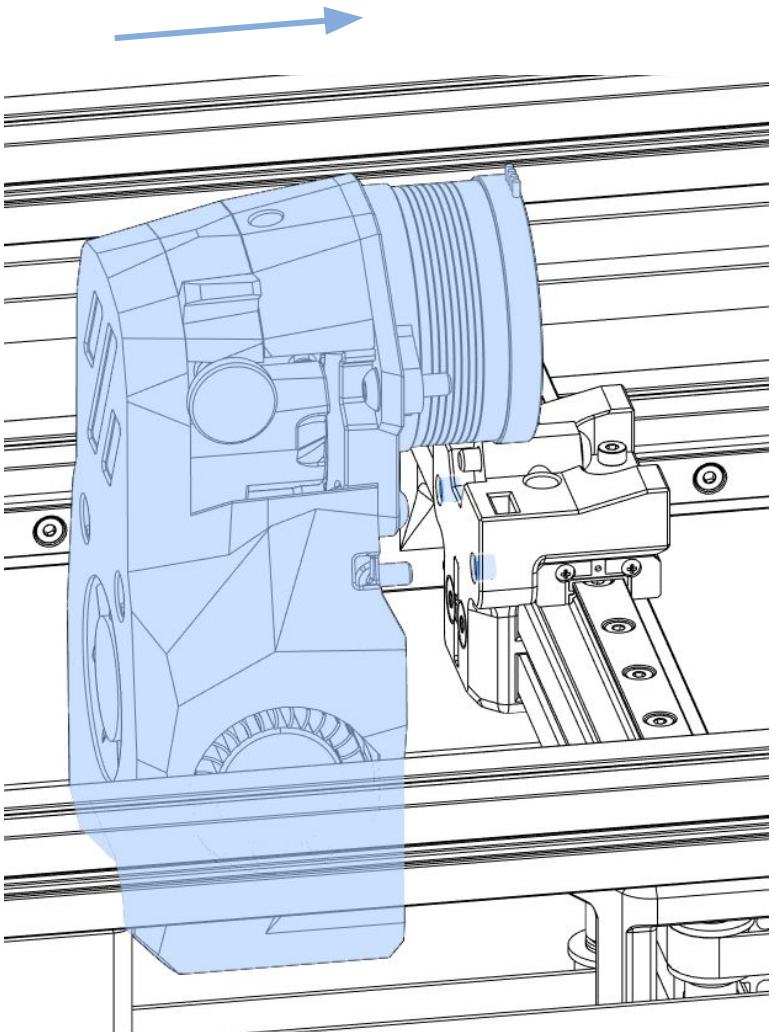


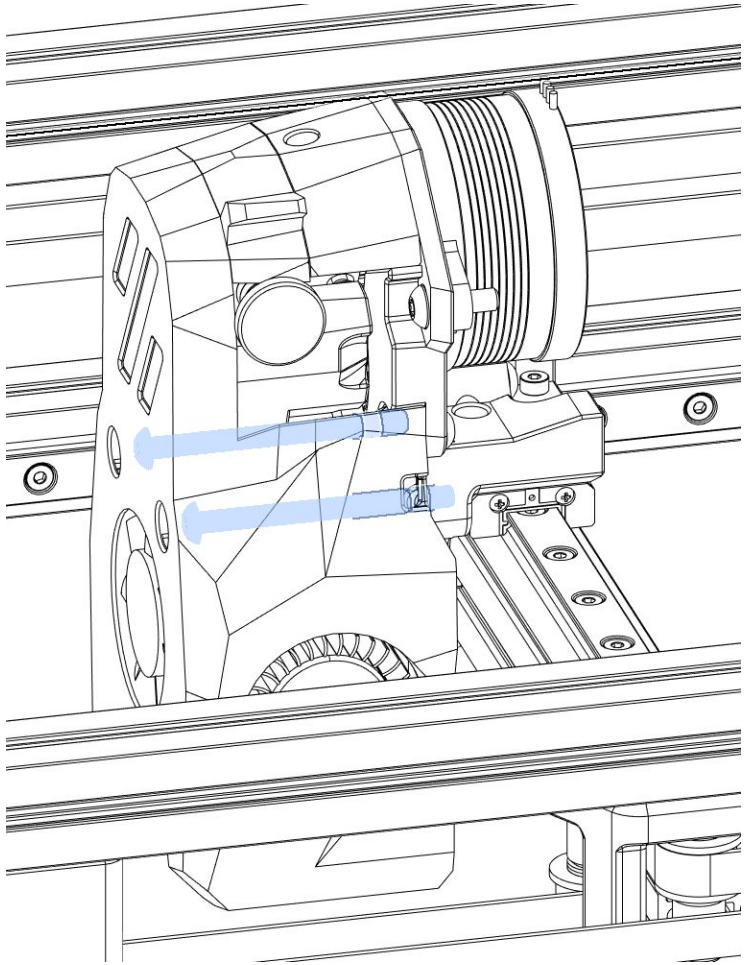


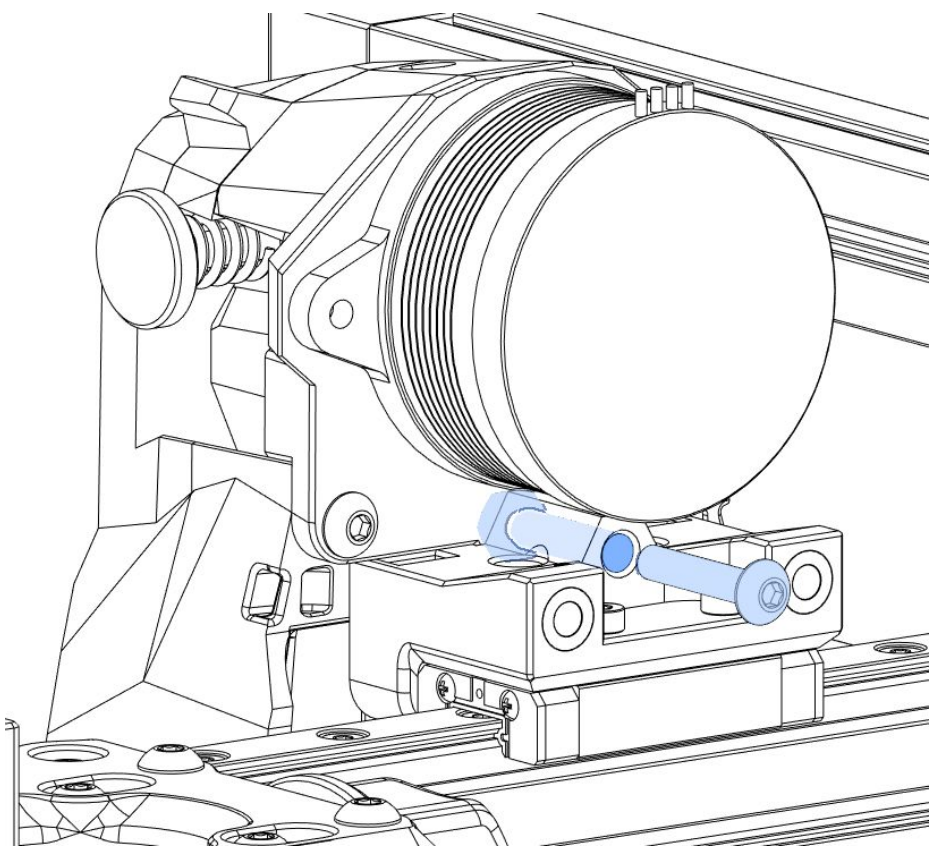
SWISS ARMY JIG

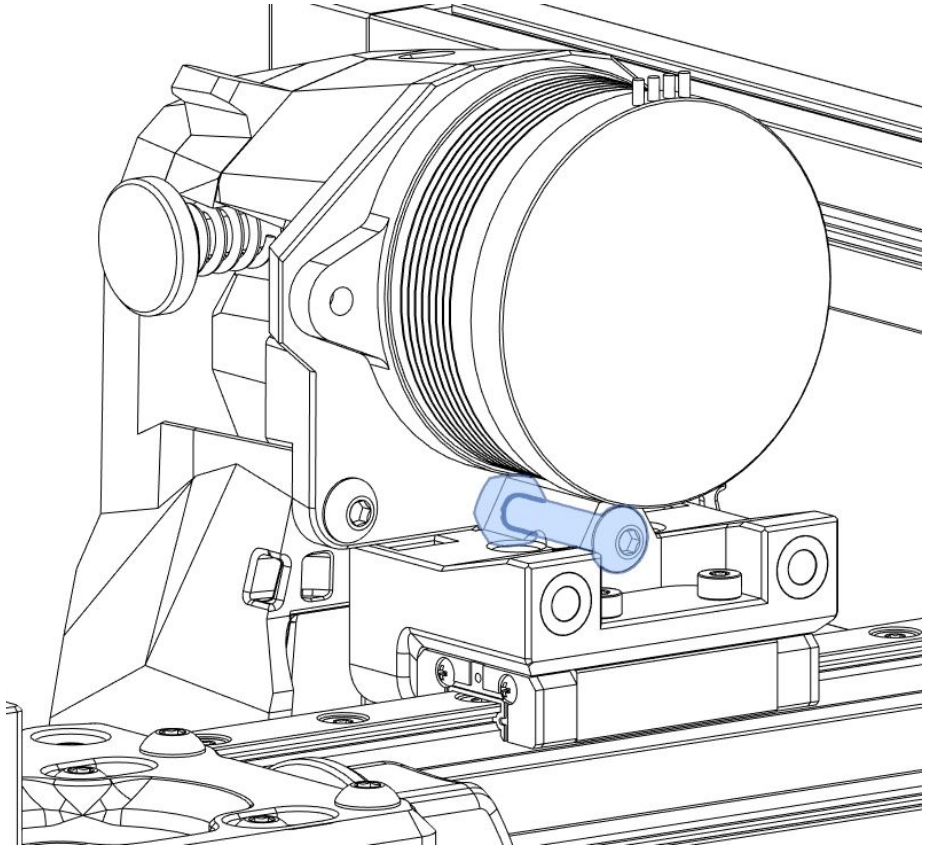
The pulley jig can also be used to trim the top of the PTFE tube to the correct length. Trim the PTFE tube after you have mounted the hotend to the plastic hotend mount and after you have inserted the PTFE tube as far into the heatsink as it will go.


REVO
REVO
M3x35 BHCS

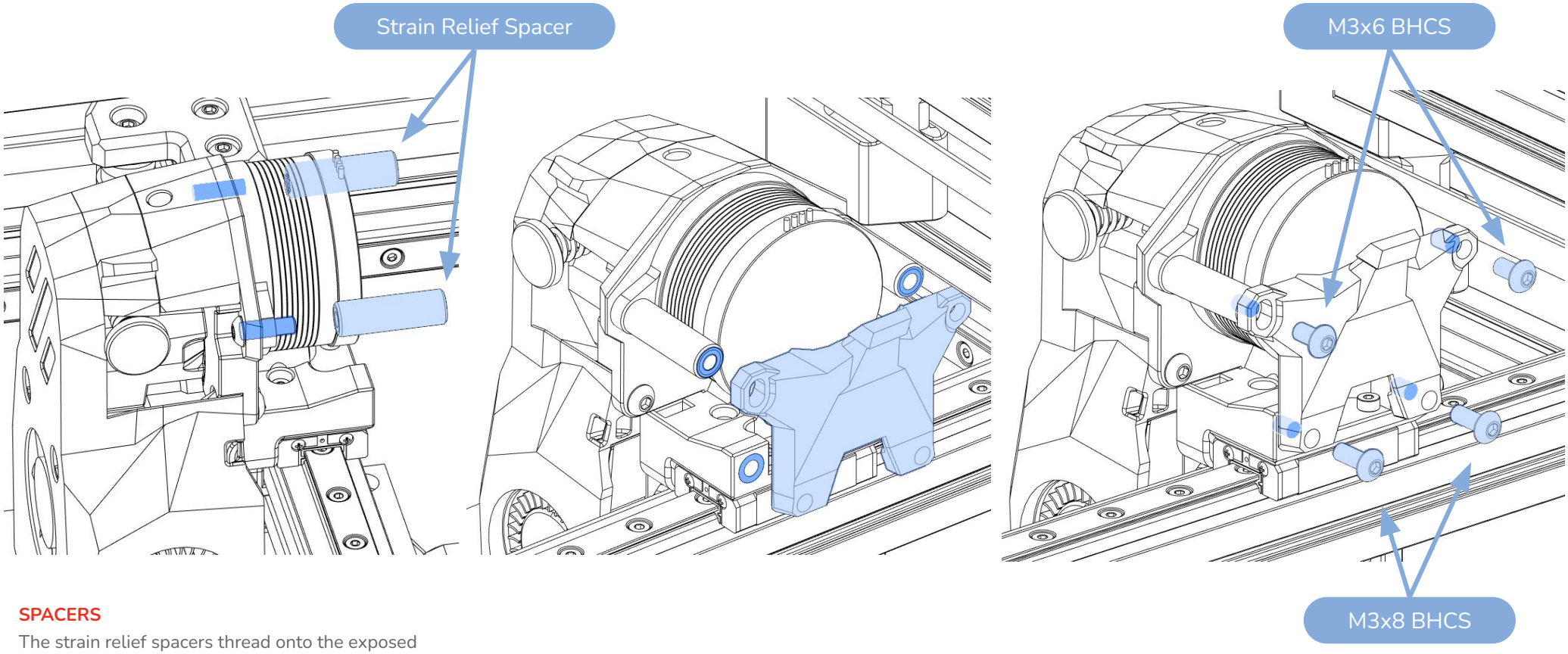








M3x16 BHCS

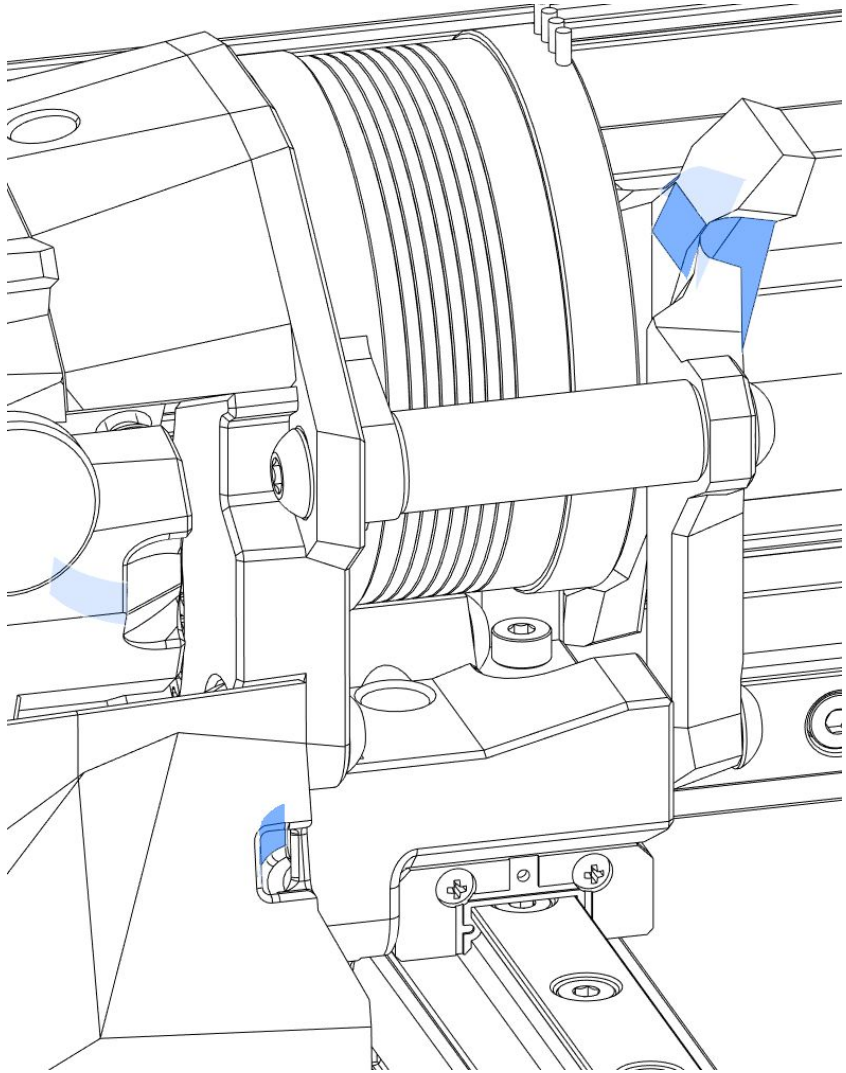


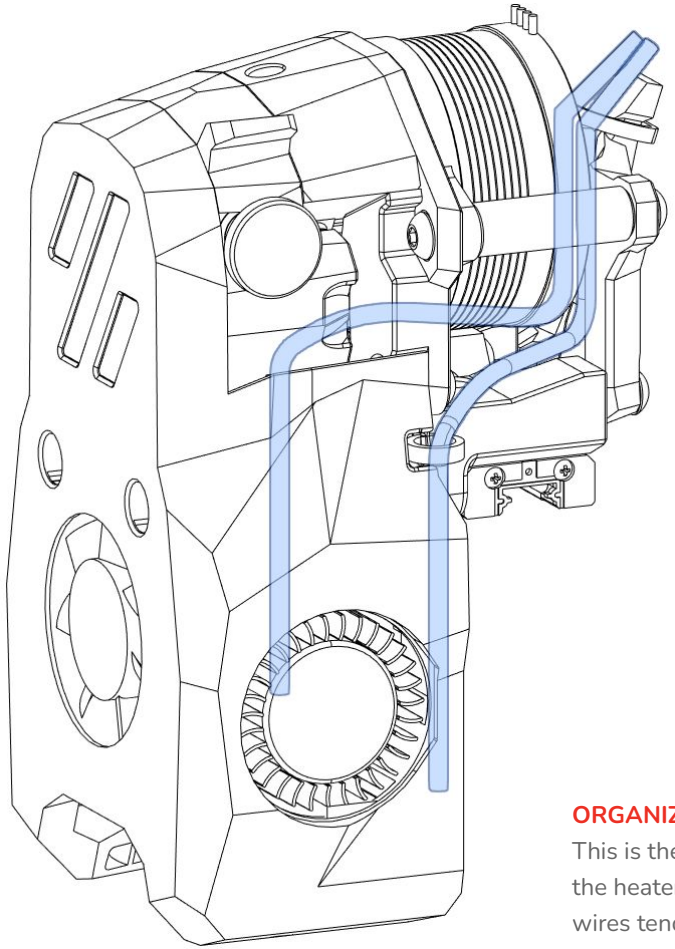
SPACERS

The strain relief spacers thread onto the exposed portion of these two M3x10 BHCS that were installed earlier.

CABLE MANAGEMENT

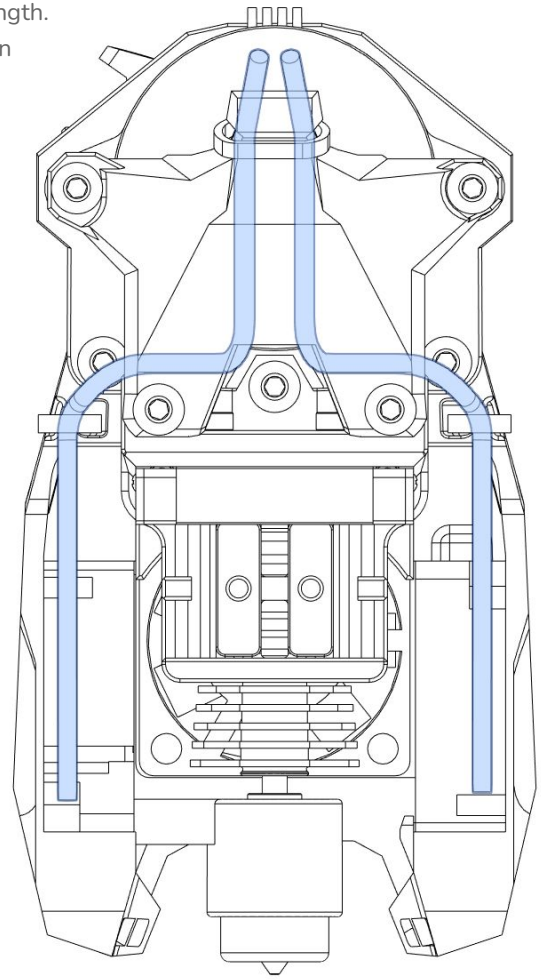
There are loops for zip-ties on either side of the toolhead and a strain relief section on the top.





UMBILICAL LENGTH

Wire length from the toolhead to the motor plate is **about 200mm**. Extra length is wasted length. The wires should have minimum slack when the toolhead is at the front of the printer.



ORGANIZATION IS KEY

This is the intended path for routing cables such as the heater thermistor and fan wires. The heater wires tend to be thicker than other wires so routing them to the opposite side as the thermistor and Hotend fan wires can help keep things balanced.